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Predicting Student Sustainability Knowledge, Attitudes, and Behaviors: Effects of Demography, Environmental Science Education, and Sustainability Intervention Programs at Georgia Southern University

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PREDICTING STUDENT SUSTAINABILITY KNOWLEDGE, ATTITUDES, AND BEHAVIORS: EFFECTS OF DEMOGRAPHY, ENVIRONMENTAL SCIENCE EDUCATION, AND SUSTAINABILITY INTERVENTION PROGRAMS AT GEORGIA SOUTHERN UNIVERSITY

by

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(Under the Direction of Lissa Leege)

ABSTRACT

This mixed-methods research approach assesses trends in sustainability knowledge, attitudes, and behaviors in the student population at Georgia Southern University (GS). Students completed a baseline survey in order to determine their knowledge and attitudes about sustainability and what sustainable behaviors they perform. A total of 1,328 useable responses to the baseline survey were gathered. Effects of race, academic class, gender, and prior completion of an environmental science course were tested, as well as the effect of campus (Statesboro and Armstrong). Previously taking an environmental science course and race/ethnicity were the two strongest indicators of knowledge score. Males scored higher than females in sustainability knowledge, but females reported more positive attitudes and more sustainable behaviors than males. The Statesboro campus reported more sustainable behaviors than Armstrong. Three short-term sustainability intervention programs modeled after formal, informal, and non-formal

educational methods were then implemented with the aim of 1) increasing student knowledge and pro-environmental attitudes, and 2) determining if one educational method had more of an effect than the others. The three programs included a lecture, a sustainability focused documentary, and a campus walk with accompanying litter pick-up. A post-survey was given immediately after completion to measure the effectiveness of each program. A total of 363 students participated in the intervention programs and post-survey. Student knowledge increased after completion of any of the three programs, but student attitudes only significantly increased after attending the lecture. This research suggests getting students involved in environmental education programs increases their knowledge and has somewhat of a positive effect on their attitudes as well. Recommendations to universities based on the results include making environmental education more inclusive, implementing extracurricular environmental activities on campus, and requiring environmental science as a course for all students.

INDEX WORDS: Sustainability, Surveys, Demographics, College campuses, Environmental education, Sustainability intervention programs

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CHAPTER 1

INTRODUCTION

Anthropogenic activities are affecting Earth's climate like never before (Cubasch et al. 2013). The human population rose from 1.5 billion in 1900 to over 6 billion in 2000, an increase of nearly 5 billion people in just a hundred years (Roser and Ortiz-Ospina 2018). At the current population growth rate, it is estimated that the number of people on the planet will reach 9.7 billion by 2050 and exceed 11 billion by 2100. (United Nations 2015). This explosive population growth is directly tied to global warming, dwindling natural resources and global destruction of habitat (Bell and Odum 2013). Promotion of environmental sustainability and addressing issues like climate change are critical to maintaining healthy communities and naturally functioning environments that promote biodiversity (Bellard et al. 2012).

Sustainability in Higher Education

One way to combat the overuse of natural resources is through educating the next generation in sustainable practices and habits that can help to address these environmental issues. Higher education has an opportunity to play a critical role in addressing the environmental crises of our time (Barth 2015). Universities are in a unique position to educate and train future generations. Historically, Institutes of Higher Education started becoming more environmentally aware in the 1980's due to student interests and activism (Posner and Stuart 2013). By 1990, a group of university representatives developed a set of statements calling higher education institutes to action, including a document called the Talloires Declaration, which highlighted the importance of educating future leaders in sustainable fields (Messineo 2012). Recycling was one of the main interests at the time, so universities began initiating recycling programs (Posner and Stuart 2013).

Since that time, our society has become aware of a myriad of environmental issues that need to be addressed, and universities can play a large part in finding solutions.

A sustainable university is defined as "A higher educational institution, as a whole or as a part, that addresses, involves and promotes, on a regional or global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfill its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles" (Velazquez et al. 2006). A sustainable university considers and implements many different types of "green" practices, such as carbon emission reduction, investment in renewable energy, and food waste reduction (Princeton 2018). The number of sustainable institutions has increased in the past few decades (Grindsted 2011). For example, the Sustainable Endowments Institute (SEI) produces a College Sustainability Report Card that includes 300 universities with the largest endowments throughout the United States and Canada. In the most recent Report Card from 2011, 52 universities received an A-, nearly double the number of schools that received the same grade in 2010 (SEI 2011). Universities are allotted points in eight categories: Administration, Climate Change and Energy, Food and Recycling, Green Building, Transportation, Endowment Transparency, Investment Priority, and Shareholder Engagement, which are then converted into letter grades between A and F (SEI 2011).

Even though focus on sustainability issues on campuses has increased, universities often focus their efforts on individual issues such as recycling and transportation and fail to promote large scale change (Posner and Stuart 2013). In the last few years, many universities have implemented more comprehensive programs that address this problem. For example, in 2006, the College of the Atlantic in Bar Harbor, Maine, was the first American university to become

completely carbon neutral (EESI 2012). Other campuses throughout the United States have proposed net-zero energy, invested in renewable resources such as geothermal and solar energy, and designed green buildings (EESI 2012).

Sustainability focused organizations have sprung up over the last few decades to help universities find ways to be more sustainable and also hold them accountable to maintain a certain level of sustainability on campus. Second Nature, founded in 1993, was one of the first programs introducing sustainability to higher education (Kerr and Hart-Steffes 2012). It has since become a coordinator and connecting organization for other well-known organizations, such as the Association for the Advancement of Sustainability in Higher Education (AASHE). AASHE strives to empower institutes of higher education to advance sustainability initiatives through networking, resource provision, outreach, and professional development (Kerr and Hart-Steffes 2012). The Higher Education Association for Sustainability Consortium (HEASC) is another one of these organizations. HEASC's mission is to "support and enhance the capacity of higher education…to exert strong leadership in making education, research, and practice for a sustainable society a reality" (Kerr and Hart-Steffes 2012).

Another example of different avenues to implementing sustainability practices on campus is demonstrated by assessing carbon emission reduction in universities that signed the American College and University Presidents' Climate Commitment (ACUPCC) (Sirianni and O'Hara 2014). When universities sign the agreement, they must commit to a set of Tangible Actions (TAs) to try to reduce carbon emissions. The different TAs are split into seven categories: LEED, Energy Star, Air Travel, Public Transport, Green Power, Investing, and Waste (Sirianni and O'Hara 2014). When the ACUPCC started, 152 universities signed on. In 2014, that number had increased to 677 (Sirianni and O'Hara 2014).

One way that universities introduce sustainability concepts to a large number of students is through First Year Programs (Messineo 2012). Sustainability topics are included in first year seminars and are often focused on "green" campus initiatives. Since more than 84% of campuses provide some type of first year program, many students are able to be reached this way (Messineo 2012). The goal of these programs is to get students thinking about sustainable choices when they first begin their education, setting a foundation for them throughout the rest of their college experience. Messineo concludes that while these programs are a good start, it is only one step in raising environmental awareness and making a real change to campus culture (2012). Another strategy of introducing sustainability that is used by universities such as Georgia Southern University is employment of an environmental science curriculum requirement. Until 2017, students at Georgia Southern were required to take an environmental science course before graduating. In making this type of class a requirement instead of a suggestion, universities can reach larger numbers of students, many of whom might never have been introduced to sustainability concepts otherwise (Stewart 2010).

While adopting campus sustainability practices has become commonplace, universities still face obstacles when trying to "go green." Adequate funding is a significant challenge for many universities. Implementation of sustainable practices may increase costs for universities initially; however, costs will decrease over time (Stafford 2011). In many cases, universities will get a return on their investment and continue to save money in the future (Stafford 2011). However, many universities do not have adequate funds to cover upfront costs. Grants from a variety of sources can be used to cover costs, but universities do not pursue these grants unless there are students, faculty, and staff on campus that are passionate about sustainability and are rewarded for their efforts. One example of how universities may attract sustainability focused students is

through implementation of specialized masters programs (Barth 2015). It is becoming more common for universities to implement these types of programs. Some examples include the University of Colorado, which started a Master of Engineering in Sustainable Development, and Graz University in Austria, with a Masters in Geography, Sustainable Urban and Regional Development. These types of programs link like-minded students and faculty together, forming a supportive environment and often contribute to furthering other campus sustainability initiatives (Barth 2015). Sustainability grant programs are another example of how universities can attract more sustainability oriented students. Syracuse University has a grant program that offers up to $50,000 in funding for projects that are focused on reducing greenhouse gas emissions and increasing awareness of sustainable practices (Syracuse University). Georgia Southern has a Sustainable Grant Program that is funded through the student Green Fee, a $10 fee students voted on that is paid every semester. This demonstrates that students are willing to help their universities become more sustainable.

Challenges to Sustainability

The millennial generation is more concerned about protecting the environment than generations before them (Valdes-Vasquez et al. 2014). Students play a large role by driving sustainability demands – they want to enroll in colleges that provide sustainability programs and resources (Grummon 2008, Bartlett and Chase 2013). However, a common challenge that modern students face is that they are aware of sustainability issues but often lack the resources to bridge the gap between awareness and action (Valdez-Vasques et al 2014). For example, students are willing to change their behavior but can become frustrated by a lack of proper infrastructure on campus (Perrault and Clark 2017). Another problem faced by universities is finding what types of motivation encouraging sustainability practices are most successful among students.

Motivation is the drive and desire a person feels to pursue their goals and values (Segar 2015). The two types of motivation are external and internal motivation. External motivation often helps us to initiate a new behavior, but is not effective for retaining that behavior. Internal motivation is more likely to drive a person to continue a behavior (Segar 2015). This is important to realize when attempting to change individuals' behavior towards more sustainable living. A continuous challenge for proponents of environmentally friendly lifestyles is getting other people to change their habits (Perrault and Clark 2017). However, there is hope: although humans are most easily influenced from the childhood to young adult years, it has been shown that people continue to be somewhat malleable up through the age of 70 (Roberts and DelVecchio 2000).

Educational Delivery Methods

For universities to be effective in teaching students to practice sustainable habits, a basic understanding of sustainability and its concepts must first be instilled. However universities choose to focus on sustainability, teaching, learning, and behavior change need to happen at institutional and individual levels for progress to occur (Kerr and Hart-Steffes 2012). It is clear that environmental education is imperative, but development and implementation of new approaches to teaching and learning about sustainability are needed (Barth 2015). One way universities may be able to expand their effectiveness in regards to environmental education is by implementing more non-formal learning options for students. Traditionally, universities have implemented formal learning, which is a structured and intentional type of learning in a specialized environment (e.g. classrooms, schools) (Manolescu, Florea, and Arustei 2018). However, in the last few decades, non-formal and informal learning have emerged in the literature as alternate forms of learning (Taylor and Caldarelli 2004; Wojcik 2004; Soykan and Atasoy 2012). Informal learning is less organized than formal learning, often happens outside of a school setting and is a more

unintentional style of learning (Tudor 2013). Examples of informal learning include social media, family and friends, films, workplaces, and more. Non-formal learning is not quite as unstructured as informal learning and is a more voluntary type of learning. It happens outside of a classroom setting but can still be provided by an educational institution (Tudor 2013). Some ways universities could incorporate non-formal learning would be environmentally focused field trips, campus sustainability walks, or inviting environmental speakers to the university.

Sustainability Assessments

In addition to educational delivery methods, assessments should be used by universities to gauge how the university is doing in its implementation of environmental education. Different types of assessments have been used to gather information about sustainable university practices and faculty, staff, and student knowledge of and attitudes towards sustainability (Barth 2015). One measure often used when working with people is distribution of a survey. Surveys can be used as tools for gathering student knowledge about sustainability (Valdes-Vasquez et al. 2014; Zwickle et al. 2014; Perrault and Clark 2017). At Ohio State University, undergraduate students were given a survey that assessed sustainability knowledge (Zwickle et al. 2014). The authors reported that upperclassmen demonstrated greater levels of knowledge than underclassmen. The largest difference was seen between freshmen and sophomore respondents (Zwickle et. al. 2014). Valdez-Velasquez et al. (2014) compiled results from a national online survey of statements about sustainability attitudes from 6,772 students in first year English classes. They compared students most interested in sustainability (MIS) to other respondents. Some of their findings indicated that MIS students are more likely to be Caucasian and female and perform better academically than non-MIS students (Valdes-Vasquez et al. 2014). Perrault and Clark (2017) looked at students' motivations for performing (or not performing) sustainable behaviors as well as what would

motivate them to perform more sustainable behaviors. They surveyed 800 students from a liberal arts university in the Midwest that has a sustainability office funded by student fees. They concluded that the main reason students performed sustainable behaviors was because they care about the environment and the impact they have on it. Students also said they would be more likely to perform more sustainable behaviors if there were incentives provided (Perrault and Clark 2017).

Purpose of the Study

The purpose of this study was two-fold. The first goal was to gather information about student knowledge of sustainability issues, attitudes towards sustainability practices, and level of participation in sustainable behaviors. If correlations exist between demographic variables of respondents and their levels of sustainability knowledge, that information can be applied to how sustainability programs are approached in the future with different types of students. This leads to the second purpose, which was to test the effectiveness of short-term sustainability intervention programs on the Statesboro and Armstrong campuses. Ultimately, the purpose of the programs that were developed was to increase sustainable behavior. The idea was that when students were exposed to sustainability programs, their knowledge of sustainability topics would increase and their attitudes towards sustainability would become more positive. If that happens, students should eventually demonstrate more sustainable behaviors (Gao 2018). The programs developed were intended only for students; a similar program for faculty and staff would be useful but is outside the scope of this thesis. Data generated from this study and implementation of successful programs can be useful for universities trying to further sustainability initiatives on campus and motivate students to practice sustainable habits.

I addressed the following questions in my research:

1. What variables are correlated with participants' sustainability knowledge, attitudes, and behaviors?
    a. Do demographic variables of participants affect sustainability knowledge, attitudes, and behavior? (e.g. race/ethnicity, gender, academic class)?
    b. What is the effect of a previous environmental science course on sustainability knowledge?
2. Do the Statesboro and Armstrong campuses differ in sustainability knowledge, attitudes, and behaviors?
3. Will participating in a sustainability intervention program increase knowledge of and attitudes towards sustainability?
    a. Do the effects of formal, informal, and non-formal intervention programs differ?

CHAPTER 2

METHODS

Study Site

Georgia Southern University (GS) is a public research university comprised of three campuses in Statesboro, Savannah (Armstrong), and Hinesville, Georgia. Total student enrollment as of Fall 2018 was 26,408, with females making up 56.4% of the student population and males making up 43.6% of the population. Approximately 3,278 graduate students and 23,130 undergraduate students attend GS. Of the three campuses, Statesboro is the only campus with a designated Center for Sustainability, established in 2008. The Center for Sustainability provides the Statesboro student population with general sustainability information, opportunities for recycling, and sustainability-focused events, programs, guest speakers, and activities throughout the year. Grants are also available through the Center for Sustainability for students, faculty, and staff to develop projects that advance sustainable initiatives on campus.

Baseline Survey

Following IRB approval (Appendix A), an electronic questionnaire was sent out to GS students at the Statesboro and Armstrong campuses beginning in Fall 2018 (Appendix B). The Hinesville campus was not included in this study because its student population is comprised of less than 600 individuals and the sample size is incomparable to Statesboro and Armstrong. The questionnaire is based on a survey developed by Dr. Adam Zwickle of Michigan State University (2014), and subsequently piloted by Scott Blair at GS in Spring 2016. The baseline survey served to determine 1) student knowledge of sustainability topics, 2) student attitudes about sustainability,

and 3) level of students' participation in performing sustainable behaviors as well as 4) demographic characteristics correlated with student responses.

The survey was created electronically through the Qualtrics program. The survey was predominately distributed through undergraduate introductory classes with permission from individual professors. Twenty-three classes spanning both the Statesboro and Armstrong campuses participated in the baseline survey. Professors from several different departments distributed the survey, including education, biology, public health, and geography. Professors were recruited via email requesting participation of their classes in the survey. Several professors gave their students the option of extra credit points for completing the survey.

The survey included different categories of questions. Demographic data were gathered, then sets of questions about sustainability knowledge, attitudes, and behavior were asked. Questions about sustainability knowledge focused on seven concepts: the definition of sustainability, water, food, biodiversity, energy, transportation, and waste. Participants were also asked how they learn about sustainability. Questions pertaining to participants' attitudes and behaviors were focused on recycling, energy conservation, food consumption, transportation, and political involvement.

Participants that responded 'strongly disagree' to an attitude question or 'never' to a behavior question were asked at the end of the survey to explain why they responded in that way. Specifically, students were asked "On one or more of the behavior questions you indicated that you "never" or "rarely" engage in a particular behavior. We would like you to explain why this is so. In other words, are there any barriers or challenges that you feel are preventing you from engaging in the behaviors associated with energy consumption, recycling, transportation, food, and political engagement? If so, is there anything you feel the university can do to allow you to engage

in these behaviors more frequently?" I wanted to get feedback directly from students to identify challenges to sustainable behaviors and determine if any of these challenges could be helped through the university or simply by increasing their knowledge about these topics.

Intervention Programs

Three different types of intervention programs were created and implemented at the Statesboro and Armstrong campuses beginning in Fall 2018 and continued in Statesboro through Spring 2019. Students were required to take the baseline survey before participating in the programs. The programs included 1) an interactive PowerPoint lecture focused on educating students about sustainability facts (Appendix C), 2) a showing of the documentary film *Racing Extinction*, which explores the role of humans in the decline of biodiversity, and 3) a campus sustainability tour during which participants also picked up litter. The content of the three programs was not identical but followed a similar theme of educating students about sustainability concepts. The PowerPoint focused on large scale concepts such as food, water, transportation, and waste. Students were encouraged to participate through discussion and answering questions. The documentary focused on human impact of wildlife but touched on several of the concepts discussed in the PowerPoint. The sustainability tour focused on educating students about the sustainable practices that have been implemented on GS's campus, but also went over more broad concepts of sustainability. The tour was also hands on – trash bags were provided and students were asked to keep an eye out for any litter they saw while walking. These programs were designed to follow the three different education styles of formal, non-formal, and informal learning to give students options and to determine whether one type of program had more of a positive effect on students' knowledge and attitudes. The PowerPoint lecture followed the more traditional

and well-studied formal learning, the film was most closely related to informal learning, and the tour followed a more non-formal learning approach.

During Fall 2018, students were recruited using fliers distributed across campus (Appendix D) and were offered incentive points from residence halls on campus. Campus residence halls participate in incentive programs in which students can attend events and earn points for their hall, and the hall with the most points at the end of the semester receives a prize. Incentives were also provided for participation in the programs. Food was provided at each program and students were able to enter a drawing for a sustainable prize from the on-campus technology store, The Tech Corner.

After completing the pre-survey, students had the option to participate in up to two of the intervention programs. The programs were re-implemented on the Statesboro campus in Spring 2019 to increase the sample size from Fall 2018. The Armstrong campus was dropped from the program implementation in Spring 2019 due to low numbers in Fall 2018 (n=3).

The approach to recruiting students in the spring semester differed from fall in an attempt to increase participation. Professors were contacted via email and asked if they would allow a program or film to be held during class time. Three professors agreed to provide class times for the program, and the PowerPoint presentation and film were given to two environmental biology classes and two education classes. The film was also shown outside of class time and advertised through the Center for Sustainability; attendance verification was provided for students to receive extra credit for coming. The campus walk was arranged outside of classes and was also advertised with aid from the Center for Sustainability. Students received either service learning hours or extra credit for participating in the walk. Intervention programs were focused on improving student

sustainability knowledge and attitudes and demographic characteristics were not collected on the post-survey.

Post-Survey

Following completion of each program, students were given a post-survey to assess whether significant reported changes in attitudes occurred, and whether sustainability knowledge increased. The post-survey was a shortened version of the baseline survey with demographic data excluded. Students that participated in the post-survey were from the same broad pool of students who were given the baseline survey. Participants were asked to identify which program they had participated in, then were given the same sets of knowledge, attitude, and behavior questions that were included in the pre-survey. Pre- and post-intervention survey scores were compared to gauge whether student knowledge increased with participation in a sustainability program, and whether the programs had any positive impact on student attitudes. Behavior change was not expected in this study, simply because the time it takes to complete one of the programs is not sufficient to change a behavior, and thus was not analyzed.

Data Analysis

The survey followed a mixed methods approach using both quantitative and qualitative analysis based on the type of question. Excel and JMP Pro 14 were used to analyze survey results. For knowledge, each question was scored as 0 (incorrect) or 1 (correct) for each participant and added together for a total of up to 7 to create a knowledge score. I analyzed the effects of gender (male or female), race (African-American, Asian, Caucasian, Hispanic, Other), academic class (freshman, sophomore, junior, senior, post-graduate), and whether or not students had previously taken an environmental science course on student knowledge scores. Data were normally

distributed with homogeneous variance. I ran each demographic separately first to test means using one-way ANOVAs and compared groups with either *t*-tests (for two groups) or Tukey-Kramer analysis (for multiple groups). I then fit an ANOVA to test for interaction effects of all four variables. Three and four-way non-significant interactions were removed from the model, and the model was refit using just two-way interactions and main effects.

Likert scale type questions for attitude and behavior were analyzed similarly to knowledge questions. Attitude questions were summed together and ranged from 20 to 100 to create an attitude score, where 20 was most negative towards the environment and 100 was the most positive. Behavior questions were also summed and ranged from 6 to 30 to create a behavior score, where 6 was the lowest amount of environmentally friendly behavior and 30 was the highest amount of environmentally friendly behavior. Both attitude and behavior scores were tested against each demographic (gender, race, class, and environmental science). All data were treated as countinuous, and while this can be considered a controversial method, the data met all recommendations as described in Harpe 2015 for categorical use (but see Bishop and Herron 2015 for opposing view). I ran each demographic separately first using one-way ANOVAs and compared groups using either t-tests (two groups) or Tukey-Kramer analysis (multiple groups). I then fit an ANOVA to test for interaction effects of all four variables on attitude and then behavior. Three and four-way non-significant interactions were removed from the model, and the model was refit using just two-way interactions and main effects. A Spearman's rank correlation was run to assess relationships between knowledge and attitude, knowledge and behavior, and attitude and behavior. To evaluate data qualitatively, open-ended responses were coded into groups by common phrases in Excel and counted to observe the top challenges that students report when it comes to living sustainably. For example, students who referenced affordability, expensiveness,

money, or finances were grouped into a category called Financial Issues (see Table 5). This is similar to other human dimension studies that analyze human attitudes and behaviors (Hruschka et al. 2004; Kahler et al. 2016). I analyzed the effects of each intervention program (lecture, film, and campus walk) on both knowledge and attitude scores using one-way ANOVAs and compared groups using Tukey-Kramer. I used matched pair tests to analyze individual change in knowledge and attitude score from pre- to post-survey.

CHAPTER 3

RESULTS

Demographics

In total, I received 1,478 responses to the baseline survey. Of those, 203 were incomplete responses and 150 were removed due to 50% or more of the survey being left blank. After removal of the incomplete responses, I was left with 1,328 usable responses. Females made up 66.6% of respondents, males made up 32.8%, and less than 1% identified as other. Caucasian students were the majority of respondents with four other ethnicities represented as well (Table 1). More students had not previously taken environmental science than had taken the course (Figure 1). The vast majority of respondents were between the ages of 18 and 25 (94.6%); because of this, age was not incorporated into the results. The top four colleges with student responses were Science and Mathematics (24.5%), Business (21.8%), Education (14.2%) and Behavioral and Social Sciences (13.2%). The top majors were biology (20.7%), elementary education (9.6%), marketing (6%), and management (5.3%). Freshmen and sophomores made up most of the survey, followed by juniors and seniors, and a small portion of post-graduates (Figure 2). The Statesboro campus students made up 81.6% of respondents, and Armstrong 18.6%. The survey was demographically representative of the students enrolled at Georgia Southern University (Table 1).

Baseline Survey

Baseline Survey: Knowledge

Several significant differences in overall knowledge score of sustainability topics were observed among demographic groups when evaluated independently (Table 2). On average, males scored roughly 8% higher than females (Figure 3). Caucasians scored 19% - 28% higher than

African American, Hispanic, and Other categories; Asians did not differ from any of the groups (Figure 4). Seniors and post-graduates did not differ from each other, but both groups scored between 20% - 31% higher than freshmen, sophomores, and juniors (Figure 5). Students that had previously taken an environmental science course scored almost 14% higher than students who had not previously taken environmental science (Figure 6). Statesboro and Armstrong campuses did not differ in knowledge scores. Environmental science and race were the two largest determining factors on student knowledge score when all four variables (gender, race, class, and environmental science) were evaluated together in a four-way ANOVA (Table 3).

Baseline Survey: Attitudes

The majority of students agreed that the actions listed in every category were "a good idea" and "made a difference." However, when asked whether they "often thought about" that action or were "easily able to perform" that action, significantly fewer students agreed (Figure 7). This trend was seen throughout all of the attitude categories except for energy, where the action given was turning off lights, and more students agreed that they were easily able to perform that action (89.9%) than agreed that the action was a good idea (87.2%) or would make a difference (87.5%). However, similar to other categories, fewer students reported that they thought about the action. The categories of voting for environmentally friendly political candidates and making sustainable food choices saw the lowest rates of agreement among students. No significant effects of any factor or its interactions (gender, race, class, and environmental science) were evident on attitude scores when evaluated together in a four-way ANOVA.

Baseline Survey: Behaviors

Students reported less occurrence of sustainable behaviors compared to attitudes (Figure 8). The percentages of students that said they performed a certain action "often" or "all of the time" were lower than students' agreement that these same actions were "a good idea" and "would make a difference" (Table 4). The only behavior that did not show a large difference compared to attitudes was the energy behavior question, which asked students how often they turned off the lights when they left a room (85.1% reported they did). The rest of the behaviors were much lower in reported occurrence. Recycling was the second highest reported behavior at 36.9%, followed by voting for environmentally friendly candidates and transportation choices. The two food-related behaviors (making sustainable choices and visiting the farmers market) were rated the lowest out of all behaviors. No significant effects of any factor or its interactions (gender, race, class, and environmental science) were evident on behavior scores when evaluated together in a four-way ANOVA.

Baseline Survey: Knowledge, Attitudes, and Behaviors

A positive correlation was found between student knowledge and attitudes ($R^2 = 0.1904$, $P < 0.0001$). Despite low behavior ratings, there was also a positive correlation found between student attitudes and behaviors ($R^2 = 0.4181$, $P < 0.0001$).

Baseline Survey: Open-Ended Questions

A total of 800 written responses were recorded and evaluated. Key words and phrases that repeatedly showed up in student responses were identified. Most students answered the first question, which asked, "Are there any barriers or challenges that you feel are preventing you from engaging in the behaviors associated with energy consumption, recycling, transportation, food, and

political engagement?," however, few students stated what they felt the university could do to help. The top five barriers/challenges that were recorded were personal issues, time constraints, financial issues, recycling issues, and transportation issues (Table 5).

Sustainability Intervention Programs and Post-Survey

In all, 336 responses were used for post-survey analysis. A total of 420 responses were recorded but incomplete responses were removed. The PowerPoint lecture had the most student participants, followed by the documentary film and the campus walk (Figure 9).

Knowledge scores increased significantly on almost every question after completion of a sustainability intervention program (Figure 10). Total knowledge score increased by 21% in the group of students that took both the pre- and post-survey ($DF = 256$, $t = 8.71$, $P < 0.0001$; Figure 11). Knowledge scores increased significantly no matter which program students attended (Figure 12). Attitude scores increased as well, most significantly in two of the five categories - voting and food choices. The other three categories, energy, recycling, and transportation all saw a significant increase in rating of the statement "this action would make a difference," but not in the other three statements. Overall attitude score increased by 8% in the post-survey group of students that participated in an intervention (DF 257, $t = 7.82$, $P < 0.0001$; Figure 13). When broken down by program, attitude scores increased significantly following the lecture. The film pre-survey group and the walk pre-survey group did not significantly differ from the post survey group, but still showed some increases (Figure 14).

Table 1. Demographic characteristics of participants in the survey as compared to all Georgia Southern University students (all campuses)

Demographic	Survey Sample (%)	Georgia Southern (all campuses)
Gender		
Male	32.8	43.6
Female	66.6	56.4
Other	0.6	N/A
Race		
Caucasian	67.5	60.4
African American	24.5	25.2
Hispanic/Latino	4.9	6.9
Asian	1.6	2.8
Other	1.5	4.7
Total	1,328	26,408

Table 2. Individual One-Way ANOVA results for each demographic group (Gender, Race, Academic Status, Environmental Science) and Campus by knowledge score (* = $P < 0.05$)

Source	df	F-value	P-value
Gender	1,1319	7.99	0.0048*
Race	4,1323	17.23	0.0001*
Academic Status	4,1323	12.06	0.0001*
Environmental Science	1,1326	25.60	0.0001*
Campus	1,1326	1.32	0.2514

Table 3. Results of Four-Way ANOVA of the combined effects of Environmental Science, Gender, Academic Status, Race, and their two-way interactions on knowledge score (*= P < 0.05)

Source	F-ratio	DF	P-value
Environmental Science	4.607	1,1236	0.0320*
Gender	0.809	1,1236	0.3686
Academic Status	1.413	4,1236	0.2273
Race	5.934	4,1236	0.0001*
Environmental Science*Gender	0.410	1,1236	0.5221
Environmental Science*Race	0.963	4,1236	0.4271
Gender*Race	1.154	4,1236	0.3298
Gender*Academic Status	0.416	4,1236	0.7972
Race*Academic Status	1.114	4,1236	0.3362

Table 4. Baseline survey behavior questions rated as 4 (often) and 5 (all the time)

Question	Response (%)
How often do you turn off the lights and electronics when you leave a room?	85.1
How often do you recycle items such as paper, cardboard, aluminum cans, and plastic bottles?	36.9
How often do you vote for political candidates who say they will strengthen environmental policies?	29.7
How often do you choose transportation based on its environmental impact?	19.3
How often do you purchase items at a local farmers market when available?	18.5
How often do you make food choices that help the environment?	16.9

Table 5. Student responses to the question “Are there any barriers or challenges that you feel are preventing you from engaging in the behaviors associated with energy consumption, recycling, transportation, food, and political engagement?” by key words/phrases and frequency of occurrence

Student Response (Key phrase)	Percent of Responses (%)
Personal Issues (laziness, inconvenience, habits, apathy, don’t know enough)	16.8
Time Restraints (too busy, sustainable options take longer, not enough time)	13.8
Recycling Issues (lack of facilities, don’t know where to recycle, not interested)	11.3
Financial Issues (can’t afford, sustainable options too expensive)	10.8
Transportation Issues (lack of choices, live too far, would rather drive)	10.3
Dietary Issues (refuse to change diet, won’t give up meat, diet doesn’t matter)	9.3
Political Issues (distrust of politicians, don’t vote)	7.9
Other or N/A	20.1

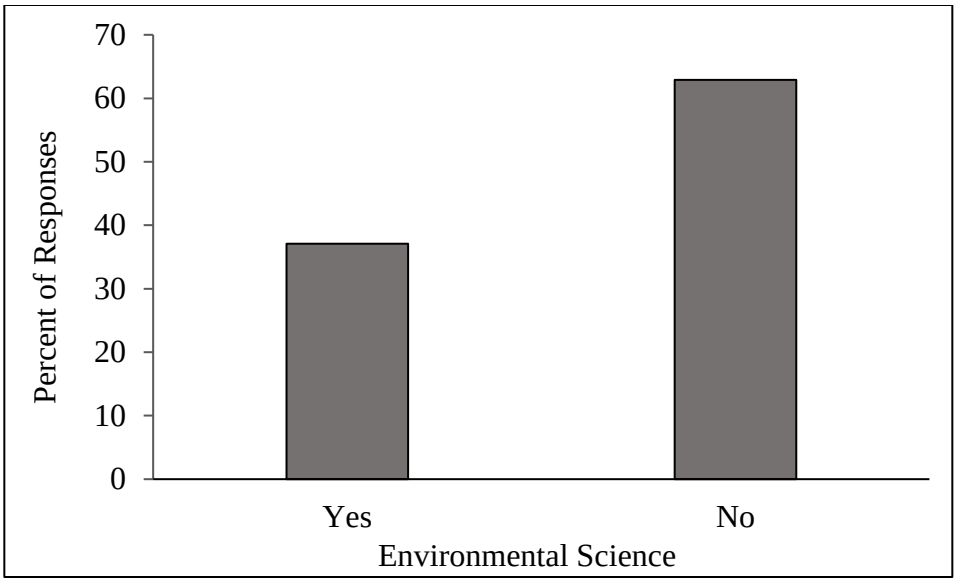

Fig 1. Distribution of participation in baseline survey by whether students had taken environmental science (N = 1328).

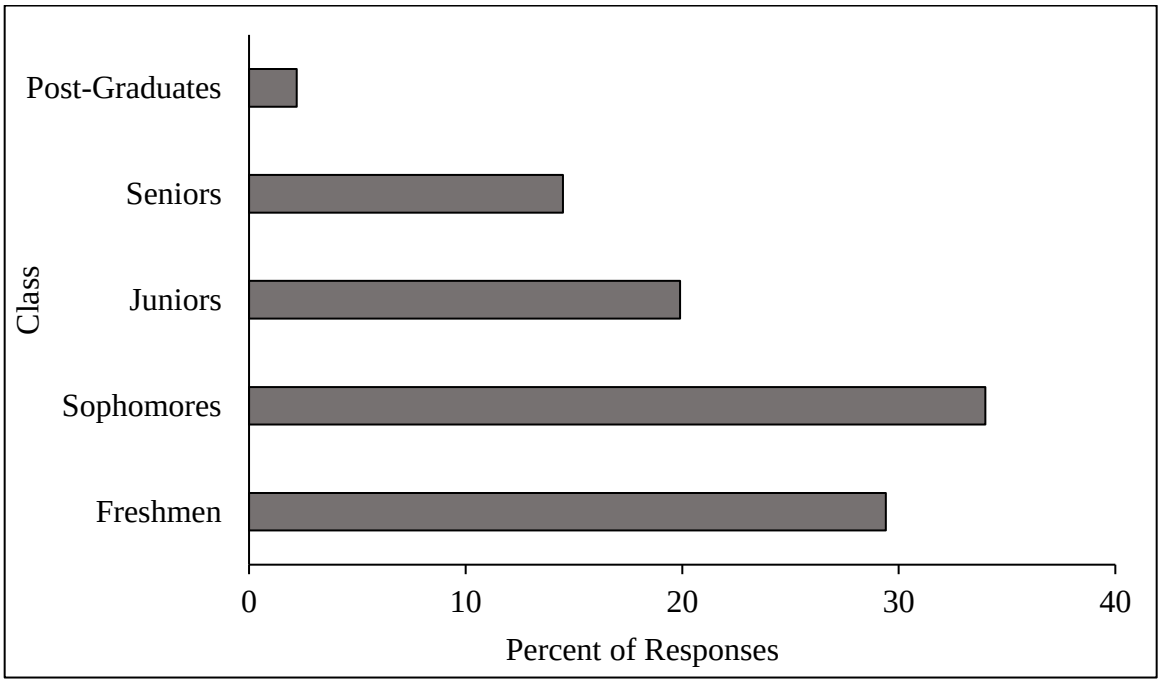

Fig 2. Distribution of participation in baseline survey by academic class (N = 1328).

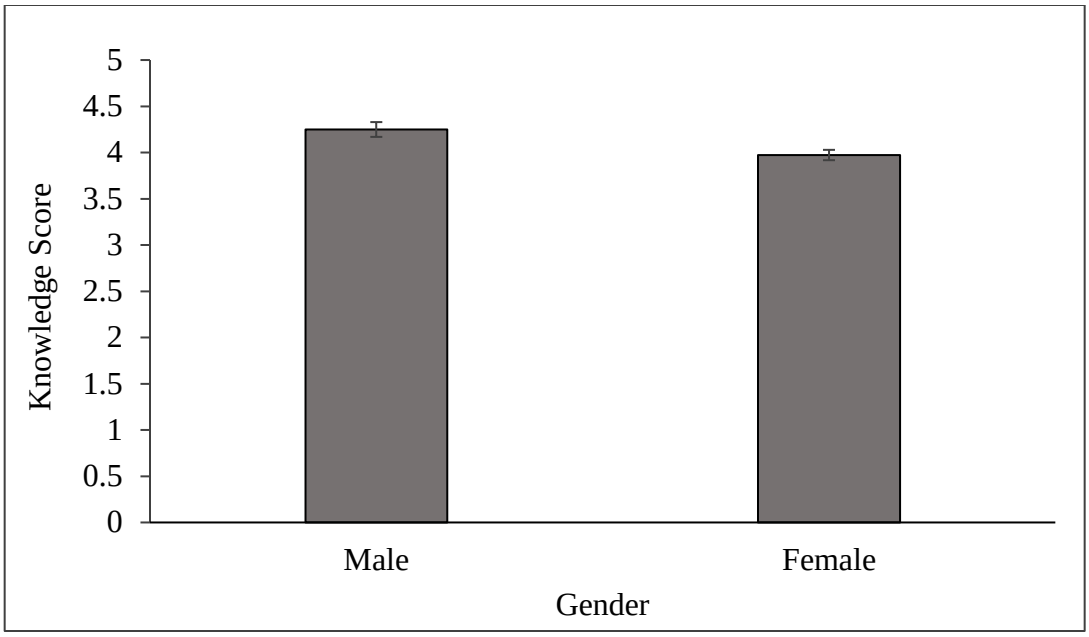

Fig 3. Knowledge score on baseline survey of participants based on gender. Males scored higher than females (N = 1319; P = 0.0048).

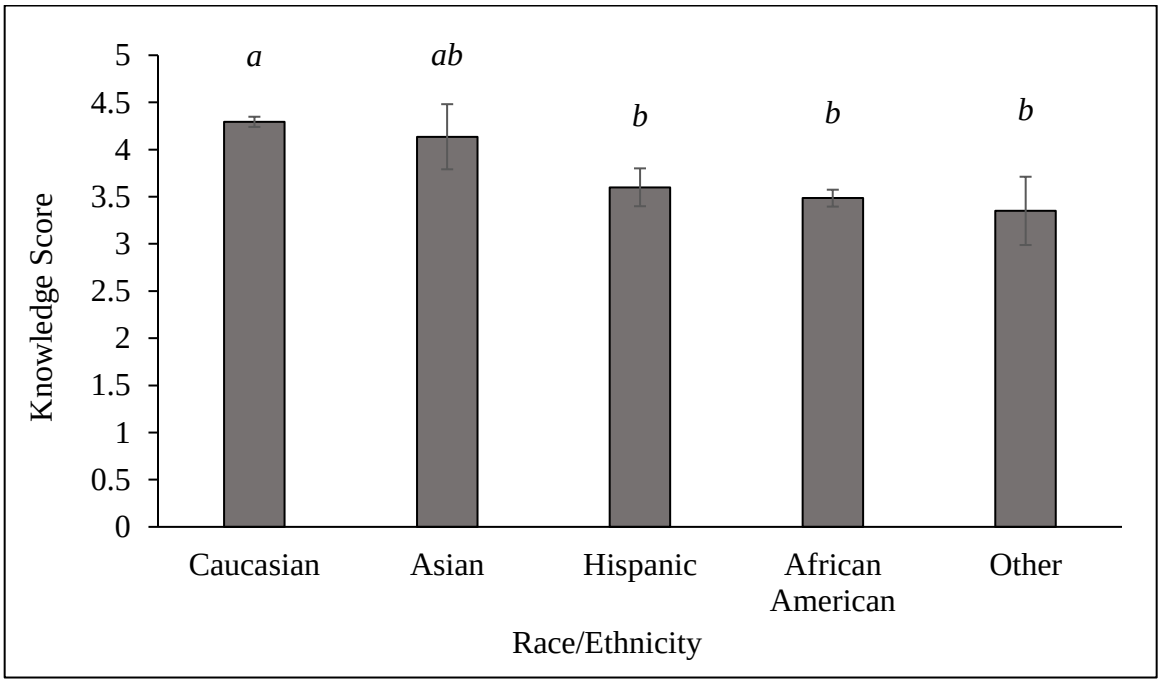

Fig 4. Knowledge score on baseline survey of participants based on race/ethnicity (N=1328). Caucasians scored higher than Hispanic (P = 0.0009), African American (P < 0.0001), and Other (P = 0.01) races. Asian student knowledge did not differ from any groups (*a* significantly differs from *b*).

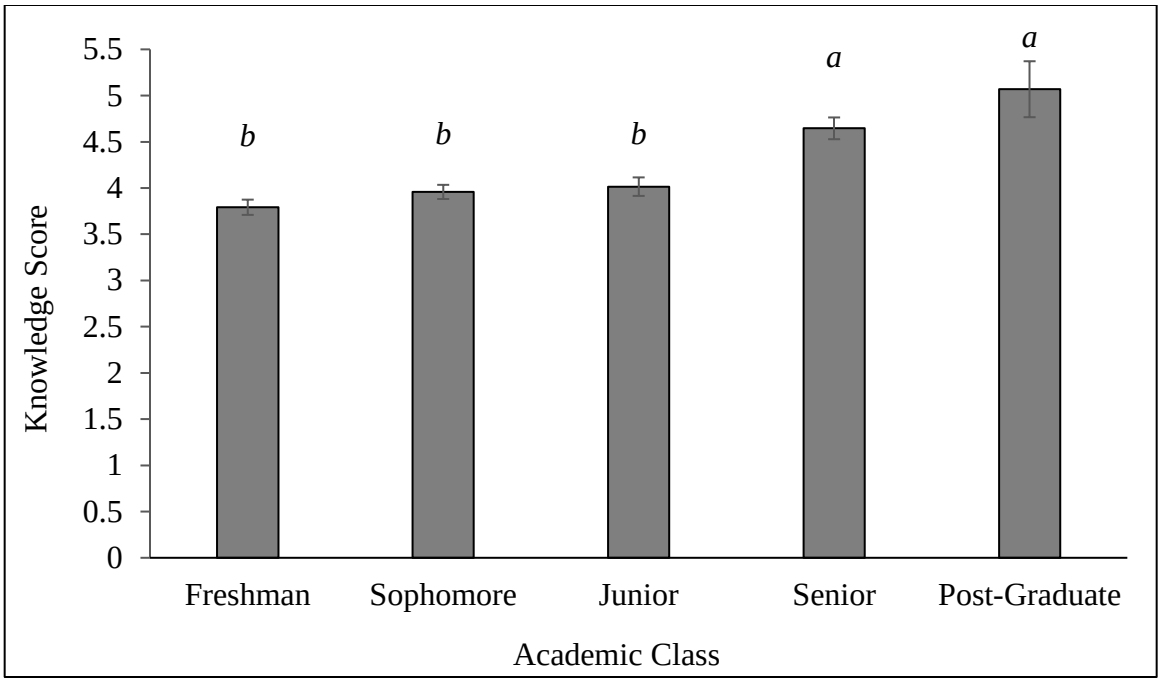

Fig 5. Knowledge score on baseline survey of participants based on academic status (N = 1328). Post-graduates scored higher than freshman (P = 0.0005), sophomores (P = 0.0036), and juniors (P = 0.0087). Seniors also scored higher than freshman (P < 0.0001), sophomores (P < 0.0001), and juniors (P = 0.0005; *a* significantly differs from *b*).

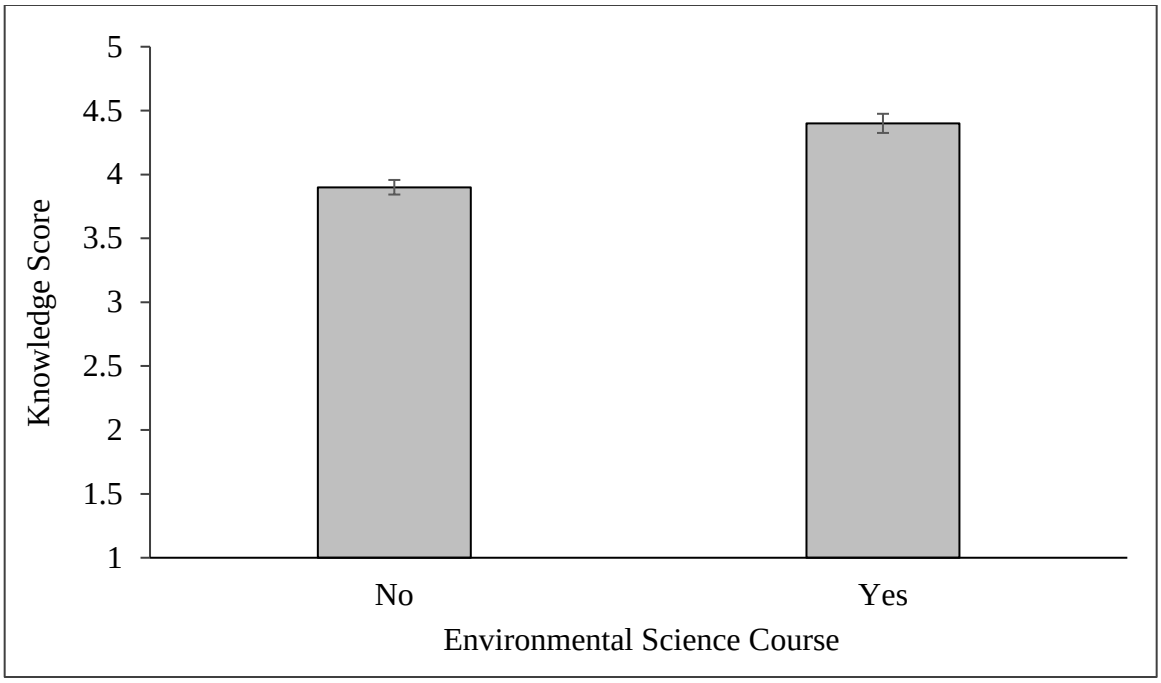

Fig 6. Knowledge score on baseline survey of participants based on whether or not they have taken an environmental science course prior to the survey. Students who have taken environmental science scored higher than students who have not taken environmental science ($N = 1328$; $P < 0.0001$).

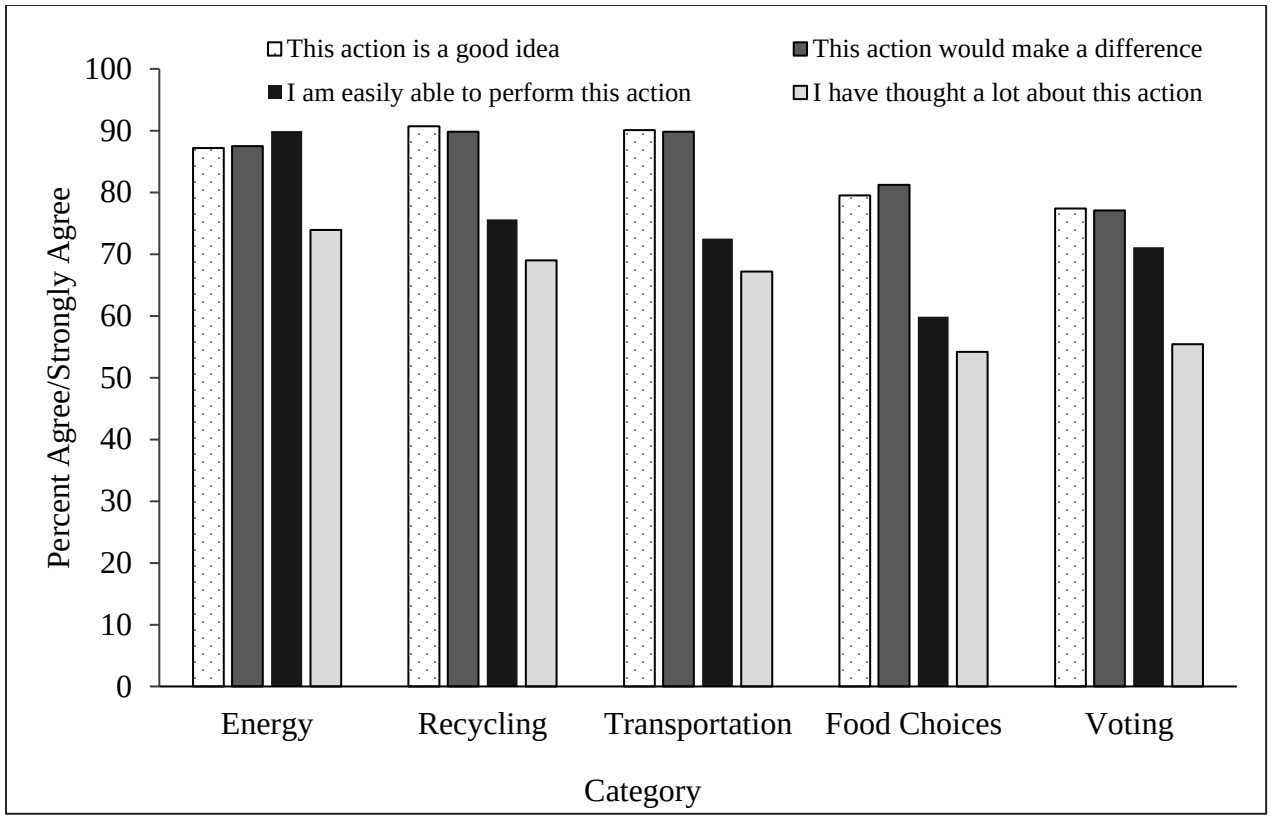

Fig 7. Baseline survey attitudes across all categories. 'This action is a good idea' and this action would make a difference' were the two most agreed-upon categories, while students agreed less with the statements 'I am easily able to perform these actions' and 'I have thought a lot about this action.'

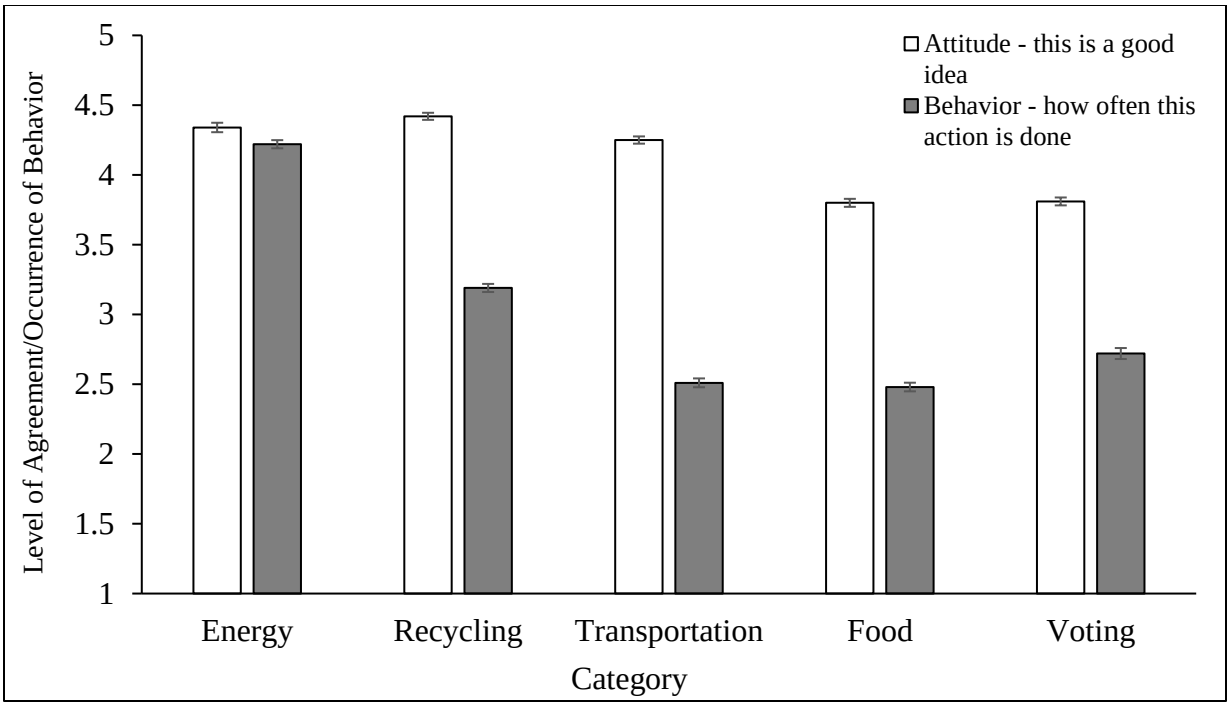

Fig 8. Baseline survey comparison of attitude question "this action is a good idea" and behavior question "how often do you do this action". Participants rated each attitude and action from 1 (strongly disagree or never) to 5 (strongly agree or always).

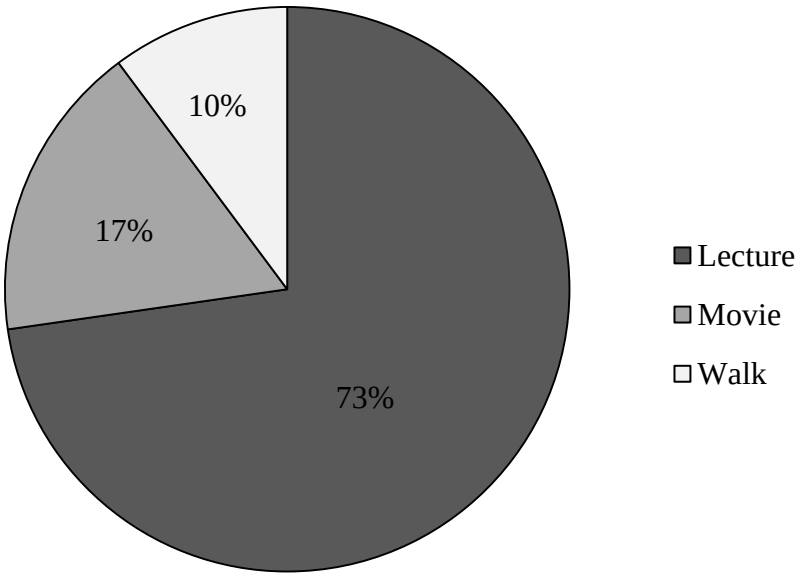

Fig 9. Breakdown of the percentage of students that attended each sustainability program (n = 363).

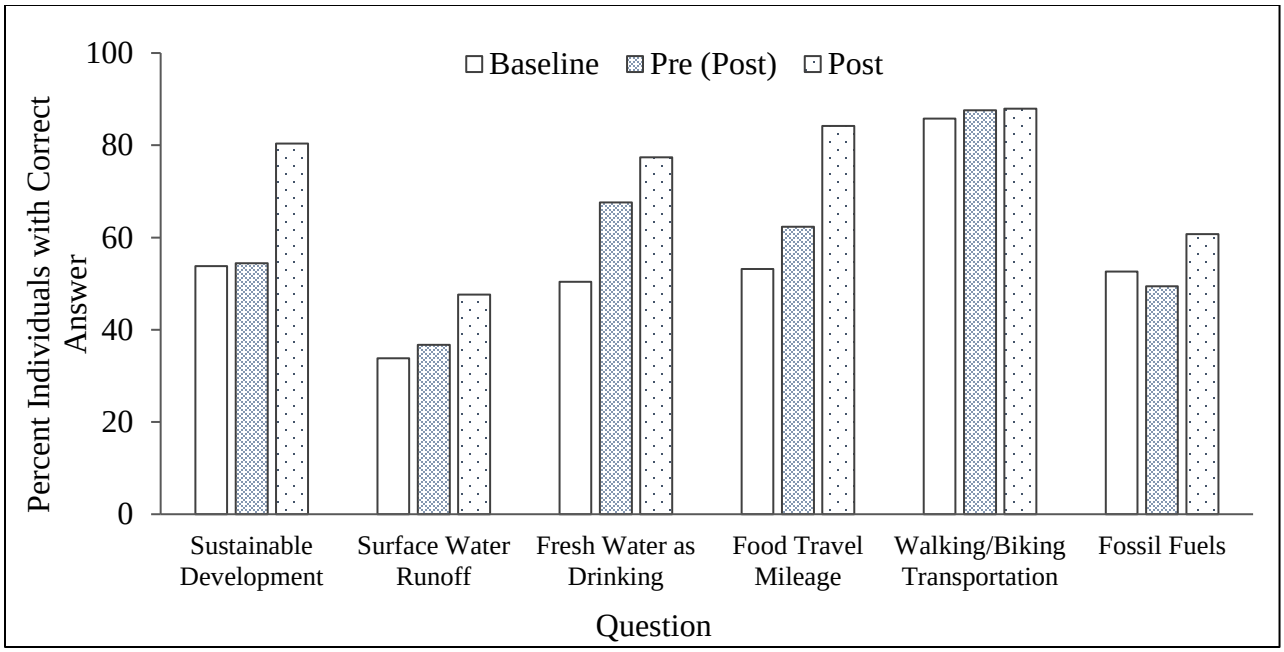

Fig 10. Percent correct responses for each knowledge question of three groups: baseline survey group, pre (for that engaged in an intervention and also took the post-survey) group, and post group. Percent correct answer rose significantly for every question in the post group except for the correct ranking of “walking or biking” being the most sustainable form of transportation.

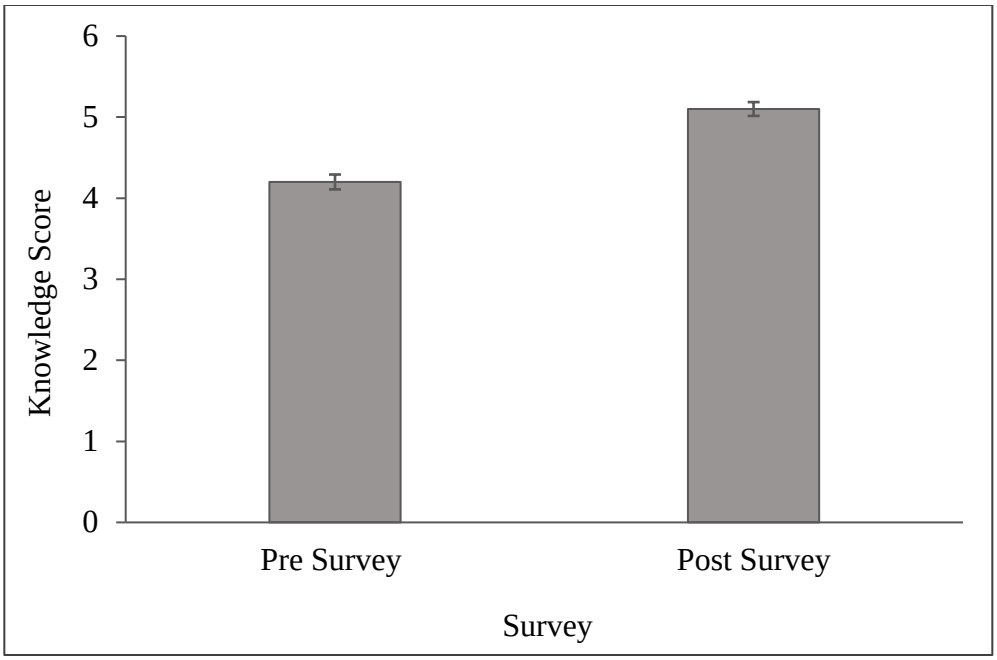

Fig 11. Knowledge scores before (Pre-Survey) and after (Post-Survey) completion of the sustainability intervention programs. Knowledge score significantly increased after completion of the programs (N = 363; P < 0.0001).

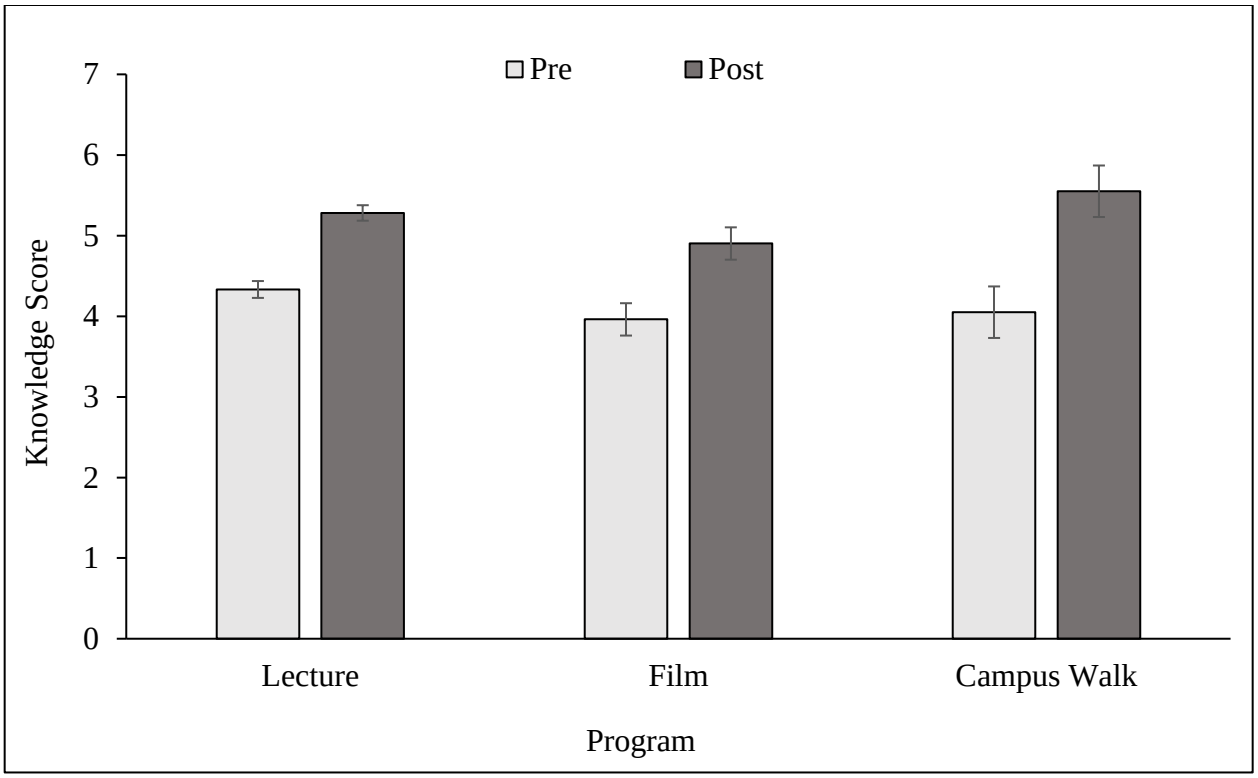

Figure 12. Mean knowledge score broken down by each program. Knowledge score increased significantly for all three programs (lecture ($P < 0.0001$), film ($P = 0.0120$), and walk ($P = 0.0123$)).

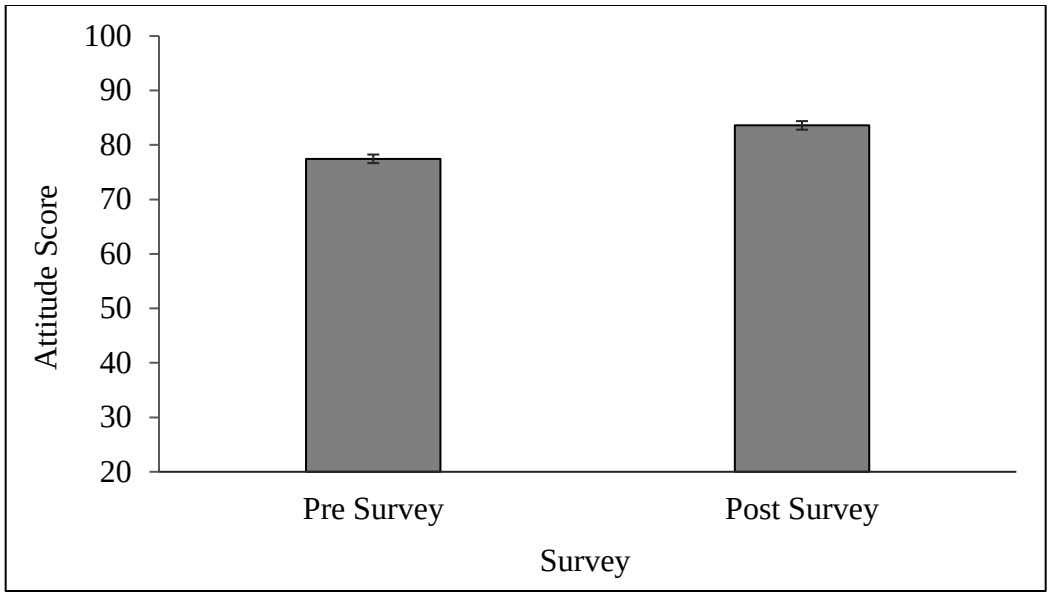

Fig 13. Attitude scores before (Pre-Survey) and after (Post-Survey) completion of the sustainability intervention programs. Attitude scores significantly increased after completion of the programs ($P < 0.0001$).

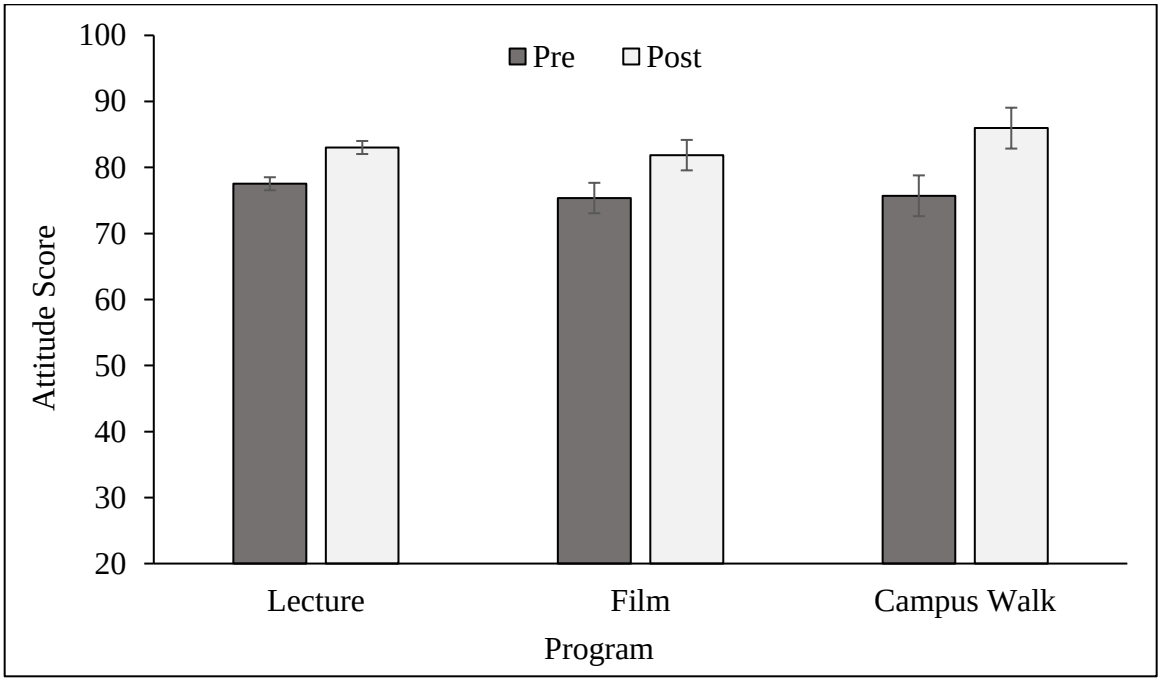

Fig 14. Attitude score broken down by each program. Attitude score significantly increased after participation in the lecture ($P = 0.0009$). The pre-survey film group and walk group did not differ from the post survey groups.

CHAPTER 4

DISCUSSION

The results demonstrated several interesting findings. Students in their senior year of college and post-graduates demonstrated higher sustainability knowledge than first, second, and third year students, and there was a significant knowledge gap among African-American and Hispanic students compared with Caucasian students. Students who had taken environmental science courses demonstrated higher knowledge of sustainability topics. Overall, students had positive attitudes towards sustainability, but those positive attitudes do not equate to sustainable behaviors. Finally, even participating in a stand-alone sustainability program increased knowledge and positive attitudes towards sustainability, no matter what type of educational program it was.

Demographics

Gender

My survey results support what much of the previous literature suggests; that certain demographic factors have an influence on environmental knowledge and pro-sustainable attitudes and behaviors (McMillan et al. 1997; Kollmuss and Agyeman 2002; Tranter 2014). Many studies show that men demonstrate a higher knowledge of sustainability concepts than women; however, women consistently demonstrate more positive attitudes towards sustainability and more sustainable behaviors (Kollmuss and Agyeman 2002; Cawthorn, Leege, and Congdon 2011; Tranter 2014). The same results were seen here. Although men scored significantly higher than women on the knowledge component of the survey, women's attitude and behavior scores were significantly higher than men's. Kollmuss and Agyeman (2002) propose that although women often know less about environmental concepts, they are more empathetic and emotionally engaged

than men, which could explain why they routinely report more positive attitudes towards the environment and more sustainable behaviors.

Race/Ethnicity

I also saw differences in regard to race/ethnicity, most notably with environmental knowledge. Caucasian students performed significantly better than Hispanic and African-American students. Previous studies support these findings and offer a few explanations (Dolin 1988; Bullard 1990; McMillan et al. 1997). McMillan et al. (1997) suggest that since minorities in the United States are typically of lower socioeconomic status, they often feel helpless to change environmental issues. Kollmuss and Agyeman (2002) explain that minorities are often lower in socioeconomic class and typically poorer than their Caucasian counterparts. When people are disadvantaged economically, they tend to focus less on issues that do not have an immediate effect on their lives which may lead to less knowledge of these topics (Kollmuss and Agyeman 2002). Minorities also typically have less experience with nature growing up, which could lead to a disconnect with environmental knowledge (Jennings and Gaither 2015; Schwarz et al. 2015). Evidence suggests that educational programs geared toward minority and low-income students would be helpful in addressing the gap in environmental knowledge (McMillan et al. 1997).

Though there is a knowledge gap between races, we do not see the same effect when it comes to attitudes and behaviors. No significant differences were seen between races when comparing attitude and behavior scores. Some studies provide evidence that different races think and behave similarly in regard to sustainability. Jones and Carter (1994) explain that while Caucasians may show more positive attitudes towards general environmental issues, African-Americans show more concern with local environmental issues, specifically concerning health, because they are often the ones most directly affected by those issues. Whittaker et al. (2005)

provide evidence supporting this finding as well, noting that on a survey of Hispanic, African-American, and Caucasian respondents there were little to no differences between the groups in terms of environmental attitudes. For some issues, persons of color reported even higher support for environmental positions than their Caucasian peers (Whittaker et al. 2005). However, other studies suggest that disadvantaged groups are often less likely to hold pro-environmental attitudes due to economic hardships and the fact that they do not have the freedom to focus on things that are not necessary to their immediate survival and safety (Buttel 1975). More research needs to be done in this area, but it is safe to say that more focus needs to be given to minorities when implementing environmental education, and inclusion needs to be a priority.

Education Level

A plethora of studies demonstrate a positive correlation between education level and environmental knowledge and attitudes (McMillan et al. 1997; Kollmuss and Agyeman 2002; Tranter 2014; Arcury and Christianson 1990). In the present study, students in their first years of college scored significantly lower compared to students who were seniors and post-graduates. This has been seen in other studies as well (Zwickle et al. 2014). This difference in knowledge did not translate to differences in attitudes in my study, which is not entirely unexpected. One study by Kempton et al. (1995) surveyed pro-environmentalists and anti-environmentalists and found no differences in their knowledge of environmental concepts, even though they clearly held different attitudes. In this study, freshman and post-graduates rated themselves as performing more sustainable behaviors than the rest of the groups. It may be expected for post-graduates to exhibit more sustainable behaviors, but it is surprising that freshman report more sustainable behaviors than some of their upper-class counterparts. However, I did not find a correlation between

knowledge and behavior in this study, so even though freshmen may not know as much as their upper-class peers, they could still demonstrate sustainable behaviors.

Campus

The Statesboro (a more rural campus) and Armstrong (a more urban campus) campuses showed no differences between knowledge or attitude, but saw a significant difference in behavior, with Statesboro reporting more sustainable. While studies typically show differences between rural and urban areas, with urban areas demonstrating higher sustainability knowledge and positive attitudes (Jones and Dunlap 1992; Arcury and Christianson 1993), students between these two campuses may not exhibit many differences demographically. Around 90% of students that attend GS come from in-state. Three highly urban counties in Atlanta are among the top five home counties of GS students. In this study, the sample size at Armstrong was much smaller than for the Statesboro campus, which may have impacted the findings. Finally, the Statesboro campus has the Center for Sustainability, which aims to increase student awareness and knowledge about sustainable topics. The Center for Sustainability could very well have had an impact on students at the Statesboro campus.

Environmental Science Education

The importance of environmental science education cannot be understated. For this study, besides race, participation in an environmental science course was the most significant factor when it came to student knowledge of sustainability concepts. My findings support the literature about the importance of integration of environmental science into higher education (Bamberg 2003; Littledyke 2006; Kagawa 2007; Boyes et al. 2008). Including environmental and sustainability topics in higher education is imperative since universities have the unique role of educating the

next generation of leaders and have the ability to produce long lasting positive environmental effects and change (von Olreich 2004).

Even though there is strong support for environmental education in higher education, there are still many challenges when implementing environmental science education. Since the 1970's, many universities have tried to incorporate some type of environmental education into their curricula and many signed on to one of the 31 declarations on Sustainability in Higher Education (SHE) to help with that goal (Grindstead 2011). While a step in the right direction, there are still issues within and among universities that make implementation of environmental education difficult. These issues include lack of knowledge and understanding of environmental topics, lack of expertise, faculty resistance, lack of administrative support, resistance from local governments, and more (Ralph and Stubbs 2014).

Research suggests that one way to combat these issues is to implement a more holistic approach to environmental education rather than the narrow disciplinary approach that has been used in the past (Juarez-Najera, Dieleman, and Turpin-Marion 2006; Sammalisto and Lindhqvist 2008; Tilbury 2011). Sterling (2004) proposed the model for integration of sustainability in education, which has three levels of implementation. The first level is called "bolting-on," or adding the concept of sustainability into the university system. This level adds separate courses that focus entirely on sustainability. The second level he calls "building-in" and includes incorporating sustainability topics into other disciplines that would not normally include environmental issues. Finally, the last level is called "transformation" and includes re-designing the university's education to include sustainability (Sterling 2004). GS has attempted to implement sustainability throughout campus in several ways with the Center for Sustainability, including the student sustainability fee and the Concentration in Environmental Sustainability, which is an

interdisciplinary 18 credit hour concentration with a focus on sustainability topics. Until 2018, GS required all students to take an Environmental Science course, which is an effective method of exposing students of all different backgrounds to sustainability. When done in small, deliberate steps, the implementation of environmental education may be much easier than trying to entirely change a university curriculum all at once.

Knowledge, Attitude, and Behavior

Many students responding in the survey demonstrated at least some basic sustainability knowledge. The data also showed that in all attitude categories, students overwhelmingly agreed that being sustainable is a good thing and would make a difference, but much lower numbers of students say that they perform sustainable behaviors. This is consistent with previous literature; rarely do environmental knowledge and positive attitude equate to performing sustainable behaviors (Kollmuss and Agyeman 2002; Cawthorn, Leege, and Congdon 2011). However, it is important to note that I found a positive correlation between attitude and behavior, so some of these students that hold pro-environmental attitudes are also practicing environmental behaviors to some degree. Human behavior and reasoning is extremely complex and is influenced by many factors at any given time. Researchers have developed models over the years to predict pro-environmental behavior (Azjen and Fishbein 1980; Fietkau and Kessel 1981; Hines et al. 1986; Kollmuss and Agyeman 2002), but there is no consensus on one best model to use. One explanation from Diekmann and Preisendoerfer (1992) is the low-cost/high-cost model of pro-environmental behavior. This model suggests that most people will choose environmentally friendly behaviors that are of a low-cost to them personally. Kagawa (2007) reported similar findings with students most likely to perform “light-green” behaviors like recycling and saving energy/water. I see the same trend in my results, with turning off lights and recycling being the two

most reported behaviors. Interestingly, the percentage of students that said they recycle often or all the time (36.9%) is extremely close to the national average of 34.7% (EPA, 2015). Ultimately, even though individuals may agree that sustainability is important, they do not necessarily perform behaviors that require larger personal sacrifices. One potential solution to this would be implementation of stronger environmental policies by government instead of being left up to individuals (i.e. required installation of energy efficient appliances, low-flow fixtures, etc).

Other research suggests that emotion is strongly tied to exhibiting pro-environmental behaviors (Grob 1991). This is one explanation for women being more likely to demonstrate positive sustainability attitudes and behaviors. Chawla (1998) suggests that experiences tied to emotions and life stages helps shape environmental attitudes and behaviors. The main experiences tied to these positive attitudes and behaviors include childhood nature experiences, pro-environmental family views, experience with environmental destruction, pro-environmental role models (friends and teachers), and education. They found that if individuals lacked emotional investment in the environment, they are much less likely to exhibit pro-environmental behaviors (Chawla 1998). As previously stated, human behavior is extremely complex, and ultimately more research is needed to decipher what makes humans behave the way they do when it comes to sustainability practices.

Sustainability Intervention Programs

Implementing the three sustainability intervention programs was an attempt to impact student sustainability knowledge and attitudes. Ultimately, I did not see any differences in knowledge scores among the different programs. However, only the lecture had a significant impact on student attitudes. This could be due, in part, to the smaller sample size for the film and the campus walk. Films are often used to evoke emotion and impact attitudes, and I would expect

to elicit the same type of response here (Kreibig 2010; Fernandez et al. 2012). Also, when students are actively engaged in learning (i.e. doing activities while learning is happening), they report more positive experiences and changes in attitude (Armbruster et al. 2009). I expected the lecture to show an increase in knowledge and attitudes. It is not an accident that formal learning has been the prevalent style for so long – it can be highly effective and an important way to deliver information (Bakan 2010; Wamsler, Brink, and Rentala 2012). Informal and non-formal education are newer ideas, but there is some support for both in terms of success. Soykan and Atasoy (2012) note the importance of non-formal education in terms of non-governmental organizations (NGOs) in many developed countries. Tudor (2013) poses that informal learning, although needing to be studied more in depth, is an effective method and possibly the most common learning method among adults. In the end, no matter which program students attended, their knowledge increased. This shows how important student participation in any type of environmental program is and supports the need for more sustainable options for university students.

Challenges to Sustainable Behavior

Students reported many challenges when it came to performing sustainable behaviors. These challenges can be categorized as internal and external factors, and here we see more instances of students listing external factors than internal. This is consistent with the literature that suggests that external factors account for up to 80% of individuals' barriers to pro-environmental behavior (Fliegenschnee and Schelakovsky 1998). Some of the most substantial challenges to note are social environment, tradition, personal relationships, availability of infrastructure, and level of personal sacrifice (Ajzen 1985; Widegren 1998).

Environmental education would help to eliminate some of the internal factors students listed, such as lack of interest, lack of knowledge about the topic, and changing personal habits,

which could ultimately lead to more pro-sustainable behaviors. However, education alone cannot fix external barriers. For these to change, many aspects of student's lives would need to change. Some of these even depend on culture and infrastructure issues, which are much larger and more complex problems to deal with. In countries where government takes a strong pro-environmental stance and implements clear environmental policies, we see fewer of these issues being a barrier (Ralph and Stubbs 2008; Daley et al. 2011).

Conclusions

Overall, my results show that GS students do have some prior knowledge of sustainability topics and see sustainability in a positive light more often than not. Also, although student reported sustainable behaviors were low overall, I found a correlation between student attitude and behavior. This means that students who do have more positive attitudes towards sustainability also tend to exhibit more sustainable behaviors. How to change individual behavior is a complex and widely debated topic and one that requires further research. It would be interesting for a follow up study to re-question these students after a certain amount of time has passed to determine whether any of them have increased their sustainable behaviors.

My research supports the idea that getting students involved in environmental education programs increases their knowledge and improves their attitudes even further, and as such we need to focus on encouraging universities to incorporate more types of these programs. For knowledge, delivery style did not matter; simple exposure to the information was enough. Ultimately, my recommendation for universities would be, at the very least, to incorporate extracurricular environmental learning activities. Implementing sustainability tours that highlight areas where the campus excels, holding sustainability themed events for students, hosting speakers, and showing sustainability documentaries are all good ways to do this. However, the best way for universities to

positively impact student sustainability knowledge and attitudes would be to require environmental science as a course for all students.

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APPENDIX A

IRB APPROVAL

Georgia Southern University
Office of Research Services & Sponsored Programs

Institutional Review Board (IRB)

Phone: 912-478-5465
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu
Veazey Hall 3000
PO Box 8005
Statesboro, GA 30460

To: Chandler, Bailey; Leege, Lissa

From: Office of Research Services and Sponsored Programs

Initial Approval Date: 8/17/2018

Expiration Date: 7/31/2019

Subject: Status of Application for Approval to Utilize Human Subjects in Research – **Expedited Review**

After a review of your proposed research project numbered **H19010**, and titled **"Assessing Sustainability Knowledge, Attitudes, and Behaviors and Implementation of a Sustainability Program at Georgia Southern University,"** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of **3000** subjects.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research.

Description: The purpose of this study is to gather information about student knowledge of sustainability issues, attitudes towards sustainability practices, and level of participation in sustainable behaviors.

If at the end of this approval period there have been no changes to the research protocol; you may request an extension of the approval period. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Eleanor Haynes
Compliance Officer

APPENDIX B

GEORGIA SOUTHERN SUSTAINABILITY SURVEY

GSU Sustainability Survey

Start of Block: Informed Consent

COLLEGE OF Science and Mathematics

DEPARTMENT OF Biological Sciences

INFORMED CONSENT

My name is Bailey Chandler and I am a graduate student in the Department of Biology at Georgia Southern University. I am conducting a study for my Master's thesis project that focuses on the sustainable habits and behaviors of Georgia Southern students.

The purpose of this research is to gather information about student knowledge of sustainability issues, their attitudes towards sustainability practices, and their levels of participation in sustainable behaviors.

Procedures to be followed: Participation in this research will include completion of a sustainability-focused survey. A small subset of participants in this survey will be invited to participate in a sustainability intervention program and follow up survey.

Discomforts and Risks: The risk of discomfort for participation in this study is minimal. Some participants may experience feelings of guilt because they do not recycle or participate in other sustainable activities.

Benefits: a. The benefits to participants include the opportunity to reflect on your attitudes about sustainability and to consider your role in maintaining a healthy planet for all living things. b. The benefits to society include an increase sustainability knowledge, attitudes, and practices among college students.

Duration/Time required from the participant: Participants will complete a survey will take no longer than twenty (20) minutes to complete.

Statement of Confidentiality: “Deidentified or coded data from this study may be placed in a publicly available repository for study validation and further research. Participants will not be identified by name in the data set or any reports using information obtained from this study, and participant confidentiality in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.”

Right to Ask Questions: Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact Bailey Chandler or Dr. Lissa Leege, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at 912-478-5465.

Compensation: If you are taking this survey for a class, professors may choose to award extra credit points for student participation in this survey. This decision is solely the professors’ to make and will vary depending upon professor. Students participating in the sustainability program will be awarded dorm points if applicable and entered into a drawing for a raffle prize. There will be one prize awarded per lesson and students may enter once for every lesson they attend. Food will be provided at each lesson for all students who attend.

Participation in this survey is completely voluntary. You may end your participation at any time by telling the person in charge, not returning the instrument or other options. You do not have to answer any questions that you do not want to answer.

Penalty: There is no penalty for deciding not to participate in this study; you may decide at any time they don’t want to participate further and may withdraw without penalty or retribution.

FERPA: We ask that you provide your Eagle ID in order to ensure that you take the survey only once. We will remove your Eagle ID from the data before using it as part of the study. Only the Primary Investigator and Faculty Advisor will have access to the data collected for this study. You will not be identified by name in any reports using information obtained from this study. All data from this study will be stored in a locked filing cabinet or secure server and archived upon the researcher’s graduation from the university. Data will

be destroyed three years after the conclusion of the research.

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H19010.

Title of Project: Assessing Sustainability Knowledge, Attitudes, and Behaviors and Implementation of a Sustainability Program onto Georgia Southern University Campus

Principal Investigator: Bailey Chandler, Biological Sciences 2250, (912) 531-3576, bj00046@georgiasouthern.edu Faculty Advisor: Dr. Lissa Leege, Biological Sciences 2264, (912) 478-0800, leege@georgiasouthern.edu

○ I acknowledge that I have read through this informed consent and I understand my rights and responsibilities as a participant in this survey (1)

End of Block: Informed Consent

Start of Block: Student Information

Q1 Please enter your nine digit Eagle ID here:

_____

This section is meant to gather descriptive information about who you are as an individual and as a member of the Georgia Southern Community. It is important for us to understand any trends in responses based on characteristics of different populations within the Georgia Southern community.

Q2 Please indicate your gender

- ○ Male (1)
- ○ Female (2)
- ○ Other (3)

Q3 Which of the following describes your race? You may select as many as apply.

- ☐ White, non-Hispanic (1)
- ☐ Black/African American, non-Hispanic (2)
- ☐ Hispanic (3)
- ☐ Asian, non-Hispanic (4)
- ☐ Other (5)

Q4 How old are you?

- ○ 18-25 (1)
- ○ 26-34 (2)
- ○ 35-54 (3)
- ○ 55-64 (4)
- ○ 65 or over (5)

Q5 Which Georgia Southern campus do you currently attend?

- ○ Statesboro (1)
- ○ Savannah (Armstrong) (2)

Q6 What College are you a part of? (You may select as many as apply)

- ☐ College of Business (1)
- ☐ College of Education (2)
- ☐ Allen E. Paulson College of Engineering and Computing (3)
- ☐ Jack N. Averitt College of Graduate Studies (4)
- ☐ College of Arts and Humanities (5)
- ☐ Jiann-Ping Hsu College of Public Health (6)
- ☐ College of Science and Mathematics (7)

- [ ] Waters College of Health Professions (8)
- [ ] College of Behavioral and Social Sciences (9)
- [ ] Other (10) _____

Q7 What is the highest level of education that you have completed?

- ○ High school/GED (1)
- ○ Vocational/technical degree or some college (2)
- ○ Bachelor's degree (3)
- ○ Master's degree (4)
- ○ Specialist's Degree (5)
- ○ PhD (6)
- ○ Ed. D. (7)
- ○ J. D. (8)
- ○ Other (9) _____

Q8 What is your current academic status?

- ○ Freshman (1)
- ○ Sophomore (2)
- ○ Junior (3)

- ○ Senior (4)
- ○ Master's Student (5)
- ○ Ph. D. Student (6)
- ○ Ed. D. Student (7)
- ○ Other (8) _____

Q9 What is your College Major?

- ☐ Accounting (1)
- ☐ Anthropology (2)
- ☐ Art (3)
- ☐ Athletic Training (4)
- ☐ Biology (5)
- ☐ Chemistry (6)
- ☐ Child and Family Development (7)
- ☐ Civil Engineering (8)
- ☐ Communication Sciences and Disorders (9)
- ☐ Communication Studies (10)

- [ ] Computer Science (11)
- [ ] Construction Management (12)
- [ ] Criminal Justice and Criminology (13)
- [ ] Economics (14)
- [ ] Electrical Engineering (15)
- [ ] Elementary Education (16)
- [ ] English (17)
- [ ] Exercise Science (18)
- [ ] Fashion Merchandising and Design (19)
- [ ] Finance (20)
- [ ] Geography (21)
- [ ] Geology (22)
- [ ] Graphic Design (23)
- [ ] Health and Physical Education (24)
- [ ] Health Education and Promotion (25)

- [ ] Health Sciences (26)
- [ ] History (27)
- [ ] Information Technology (28)
- [ ] Information Technology (WebBSIT) Online (29)
- [ ] Interdisciplinary Studies (30)
- [ ] Interdisciplinary Studies Online (31)
- [ ] Interior Design (32)
- [ ] International Studies (33)
- [ ] International Trade (34)
- [ ] Logistics and Intermodal Transportation (35)
- [ ] Management (36)
- [ ] Manufacturing Engineering (37)
- [ ] Marketing (38)
- [ ] Mathematical Sciences (39)
- [ ] Mechanical Engineering (40)

- [ ] Medical Laboratory Science (41)
- [ ] Middle Grades Education (42)
- [ ] Modern Languages (43)
- [ ] Multimedia Film and Production (44)
- [ ] Multimedia Journalism (45)
- [ ] Music (46)
- [ ] Music Education (47)
- [ ] Nursing (48)
- [ ] Nutrition and Food Science (49)
- [ ] Philosophy (50)
- [ ] Physics and Astronomy (51)
- [ ] Political Science (52)
- [ ] Psychology (53)
- [ ] Public Relations (54)
- [ ] Radiologic Sciences (55)

- [ ] Recreation (56)
- [ ] Rehabilitation Sciences (57)
- [ ] Respiratory Therapy (58)
- [ ] Secondary Education (59)
- [ ] Sociology (60)
- [ ] Special Education (61)
- [ ] Sport Management (62)
- [ ] Theatre (63)
- [ ] Writing and Linguistics (64)
- [ ] Master of Accounting (65)
- [ ] Master of Arts English (66)
- [ ] Master of Arts History (67)
- [ ] Master of Arts Social Science (68)
- [ ] Master of Arts Spanish (69)
- [ ] Master of Art in Teaching (70)

- [ ] Master of Arts Special Education (71)
- [ ] Master of Business Administration (72)
- [ ] Online MBA (73)
- [ ] Master of Education (74)
- [ ] Master of Fine Arts (75)
- [ ] Master of Healthcare Administration (76)
- [ ] Master of Music (77)
- [ ] Master of Public Administration (78)
- [ ] Master of Public Health (79)
- [ ] Master of Science Applied Economics (80)
- [ ] Masters of Applied Engineering (81)
- [ ] Master of Science Biology (82)
- [ ] Master of Science Physical Science (83)

- [ ] Masters in Computer Science (84)
- [ ] Master of Science Experimental Psychology (85)
- [ ] Master of Science Kinesiology (86)
- [ ] Master of Science Mathematics (87)
- [ ] BSN-DNP (88)
- [ ] Masters of Sports Management (89)
- [ ] Doctor of Education (90)
- [ ] PHD Logistics Supply Chain Management (91)
- [ ] Doctor of Nursing Practice (92)
- [ ] Doctor of Psychology (93)
- [ ] Doctorate of Public Health (94)
- [ ] Education Specialist Degree (95)
- [ ] Other (96)

☐ Do not wish to answer (97)

Q10 What is your current or most recent GPA, to the best of your recollection?

_____

Q11 What is your current living arrangement?

- I live on campus (1)
- I live off campus (2)

Display This Question:

If What is your current living arrangement? = I live off campus

Q11A You indicated you live off campus. How are your utilities (electricity, gas/oil, water) paid for?

- I pay for all of my own utilities (1)
- I share the cost of utilities with roommates (2)
- I live with my family and they pay the utilities (3)
- I live somewhere where my utilities are included as part of my rent (4)
- Other (5) _____

Display This Question:

If What is your current living arrangement? = I live on campus

Q11B You indicated that you live on campus. Which residence hall do you live in?

- Centennial Place (1)
- Eagle Village (2)
- Freedom's Landing (3)
- Kennedy (4)

- ○ Southern Courtyard (5)
- ○ Southern Pines (6)
- ○ University Villas (7)
- ○ Watson (8)
- ○ Windward Commons (9)
- ○ Compass Point (10)
- ○ University Crossings (11)
- ○ University Terrace (12)
- ○ Other (13) _____

Q12 Have you previously taken an Environmental Science course?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Have you previously taken an Environmental Science course? = Yes

Q12A What is the most recent Environmental Science course level you have completed?

- ○ Middle School (1)

- ○ High School (2)
- ○ College (3)

Q13 In general, I believe that the government should intervene in economic issues.
(economic issues would include items such as government debt, regulation over private commerce and taxes)

- ○ Strongly agree (1)
- ○ Agree (2)
- ○ Neither agree or disagree (3)
- ○ Disagree (4)
- ○ Strongly disagree (5)
- ○ Don't know (6)

Q14 In general, I believe the government should intervene in social issues.
(social issues would include items such as healthcare, poverty, and the environment)

- ○ Strongly Agree (1)
- ○ Agree (2)
- ○ Neither agree or disagree (3)

- ○ Disagree (4)
- ○ Strongly Disagree (5)
- ○ Don't know (6)

End of Block: Student Information

Start of Block: Sustainability Knowledge

This set of questions is meant to assess your general knowledge of sustainability principles and practices. Please respond to the best of your ability, and if you do not know an answer please select "Don't Know".

Q15 Which of the following is the most commonly used definition of sustainable development?

- ○ Creating a government welfare system that ensures universal access to education, health care, and social services (1)
- ○ Building a neighborhood that is both socio-demographically and economically diverse (2)
- ○ Meeting the needs of the present without compromising the ability of future generations to meet their own needs (3)
- ○ Setting aside resources for preservation, never to be used (4)
- ○ Don't know (5)

Q16 What is the most common cause of pollution of streams and rivers in the U.S.?

- ○ Dumping of garbage by cities (1)
- ○ Surface water running off of yards, city streets, paved lots, and farm fields (2)
- ○ Litter near streams and rivers (3)
- ○ Waste dumped by factories (4)
- ○ Don't know (5)

Display This Question:

If Which Georgia Southern campus do you currently attend? = Statesboro

Q16A True or False, Bulloch County (the county that the Georgia Southern Statesboro campus resides in) currently has an operational landfill.

- True (1)
- False (2)
- Don't know (3)

Display This Question:

If Which Georgia Southern campus do you currently attend? = Savannah (Armstrong)

Q16B True or False, Chatham County (the county that the Georgia Southern Armstrong campus resides in) currently has an operational landfill.

- True (1)
- False (2)
- Don't know (3)

Q17 What percent of the world's water is freshwater that is easily accessible as drinking water?

- 4% (1)
- 50% (2)
- 20% (3)
- less than 1% (4)

○ Don't know (5)

Q18 It is estimated that the average American meal travels 1500 miles from farm to plate.

○ True (1)

○ False (2)

○ Don't know (3)

Q19 Please rank the following transportation choices from most sustainable (1) to least sustainable (4). (To rank choices, click on one and drag it up or down)

_____ Walking or Biking (1)

_____ Driving a vehicle powered completely by fossil fuels (2)

_____ Driving a hybrid or electric vehicle (3)

_____ Carpooling or taking public transportation (4)

Q20 Which one of the following statements is true?

○ Incandescent light bulbs are the most energy efficient bulbs available on the market. (1)

○ Burning fossil fuels (e.g. coal, oil) releases greenhouse gases into the atmosphere. (2)

○ Most electricity production in the United States comes from nuclear power plants. (3)

○ Keeping the thermostat in your house at 70 degrees year-round is more energy efficient than setting it at 78 in the summer and 68 in the winter. (4)

○ Don't know (5)

Q21 A bioswale is a vegetated depression that collects storm water run-off from nearby surfaces such as roads and parking lots.

What would be the benefits of having bioswales on campus? (select all that apply).

- ☐ Bioswales absorb excess stormwater, which helps to reduce the likelihood of flooding (1)
- ☐ Bioswales provide habitat for wildlife (2)
- ☐ Bioswales create a drinkable water source (3)
- ☐ Bioswales absorb and filter pollutants (4)
- ☐ Don't know (5)

End of Block: Sustainability Knowledge

Start of Block: Sustainability Behaviors

There are a number of behaviors people can engage in that help make the world a more sustainable place to live. This next set of questions is meant to assess your engagement in sustainable behaviors and your thoughts regarding those behaviors. Please answer these questions as honestly as possible.

Display This Question:

If What is your current living arrangement? = I live off campus

Q22 One action that some students do to try to protect the environment is: **Turn off lights and electronic appliances (i.e. Television, Computer and Radio) when they leave a room.**

Please indicate the degree to which you disagree or agree with each of the following statements

	Strongly disagree (1)	Disagree (2)	Neither agree nor Disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Display This Question:

If What is your current living arrangement? = I live off campus

Q23 How often do you **turn off the lights and electronic appliances** (i.e. Television, Computer and Radio) **when you leave a room**?

- ○ Never (1)
- ○ Rarely (2)
- ○ Sometimes (3)
- ○ Often (4)
- ○ All of the time (5)

Display This Question:

If What is your current living arrangement? = I live on campus

Q24 One action that some students do to try to protect the environment is: **Turn off the lights and other electronic appliances (i.e. Television, Computer, Radio) when they leave their dorm room.**

Please indicate the degree to which you disagree or agree with each of the following statements

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Display This Question:

If What is your current living arrangement? = I live on campus

Q25 How often do you **turn off the lights and other electronic appliances (i.e. Television, Computer and Radio) when you leave your dorm room**?

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- All of the time (5)

Q26 One action that some people do to try to protect the environment is: **Recycle items such as cardboard, paper, aluminum cans, and plastic bottles.**

Please indicate the degree to which you disagree or agree with each of the following statements.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Q27 How often do you **recycle items such as paper, cardboard, aluminum cans, and plastic bottles?**

- ○ Never (1)
- ○ Rarely (2)
- ○ Sometimes (3)
- ○ Often (4)
- ○ All of the time (5)

Q28 One action that some people do to try to protect the environment is: **Choose transportation with lower environmental impact whenever possible (i.e. bus, bike, walk) to help the environment.**

Please indicate the degree to which you disagree or agree with each of the following statements.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Q29 How often do you **choose transportation based on its environmental impact**?

- ○ Never (1)
- ○ Rarely (2)
- ○ Sometimes (3)
- ○ Often (4)
- ○ All of the time (5)

Q30A Please choose which of the following best describes how you travel ***on*** campus.

- ○ When I travel on campus I most often use a bicycle. (1)
- ○ When I travel on campus I most often use a personal vehicle (car, van, or truck). (2)
- ○ When I travel on campus I most often walk. (3)
- ○ When I travel on campus I most often use the bus system. (4)
- ○ Other (5) _____

Display This Question:

If What is your current living arrangement? != I live on campus

Q30B Please choose which of the following best describes how you commute ***to*** campus.

- ○ When I commute to campus I most often use a bicycle. (1)
- ○ When I commute to campus I most often use a personal vehicle (car, truck or van). (2)
- ○ When I commute to campus I most often walk. (3)
- ○ When I commute to campus I most often carpool with other people. (4)
- ○ When I commute to campus I most often use the bus system. (5)
- ○ Other (6) _____

Q31 One action that some people do to try to protect the environment is: **Make food choices that help the environment (e.g., eat less meat, local food, less pesticides) whenever possible.**

Please indicate the degree to which you disagree or agree with each of the following statements.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Q32 How often do you **make food choices that help the environment**?

○ Never (1)

○ Rarely (2)

○ Sometimes (3)

○ Often (4)

○ All of the time (5)

Q33 How often would you say that you have ***purchased*** items at a local farmer's market when available?

- ○ Never (1)
- ○ Rarely (2)
- ○ Sometimes (3)
- ○ Often (4)
- ○ Every time it is available (5)

Q34 One action that some people do to try to protect the environment is: **Vote for political candidates who say they will strengthen environmental policies**.

Please indicate the degree to which you disagree or agree with each of the following statements.

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
This action is a good idea. (1)	○	○	○	○	○
This action would make a difference (2)	○	○	○	○	○
I am able to easily perform this action. (3)	○	○	○	○	○
I have thought a lot about this action. (4)	○	○	○	○	○

Q35 How often do you **vote for political candidates who say they will strengthen environmental policies**?

- ○ Never (1)
- ○ Rarely (2)
- ○ Sometimes (3)
- ○ Often (4)
- ○ All of the time (5)
- ○ Don't know (6)

Q36 On one or more of the behavior questions you indicated that you "never" or "rarely" engage in a particular behavior. We would like you to explain why this is so. In other words, are there any barriers or challenges that you feel are preventing you from engaging in the behaviors associated with energy consumption, recycling, transportation, food, and political engagement? If so, is there anything you feel the university can do to allow you to engage in these behaviors more frequently?

Q37 Where do you learn about environmental topics?

- ☐ Other people through social networks (e.g., Facebook, Twitter) (1)
- ☐ Newspapers and magazines (2)
- ☐ Friends (3)
- ☐ Family (4)
- ☐ Online news websites (5)
- ☐ University websites (6)
- ☐ I do not learn about environmental topics from any of these (7)

Q38 Are you interested in learning more about sustainability related opportunities on campus?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Are you interested in learning more about sustainability related opportunities on campus? = Yes

Q39 Please provide an email address to receive information about sustainable opportunities on campus from the Center for Sustainability.

○ Email (1) _____

End of Block: Sustainability Behaviors

APPENDIX C

SUSTAINABILITY POWERPOINT LECTURE

Environmental Sustainability

Intervention Program #1

Bailey Chandler

- Please take the pre-survey if you haven't already done so!
- https://tinyurl.com/yb8pvenr

What does sustainability mean to you?

What is sustainability?

- The most common definition of sustainability is taken from the Brundtland Report (1987)
- "The ability to meet the needs of the present without compromising the ability of future generations to meet their own needs"

Why should we care?

- Earth's population has exploded in the last 150 years from ~1 billion people to nearly 8 billion today
- Resources are being consumed at alarming speed
  - Consumer culture
- The Earth's atmosphere is warming at faster rates than ever before
- World Population Clock: https://www.census.gov/popclock/world

Why should we care?

- 70% of carbon emissions have been produced by the richest 20% of the world
- The US alone is responsible for 29% of all human caused CO_2 emissions
- If we continue at current rates, future generations' ability to meet their needs will be compromised

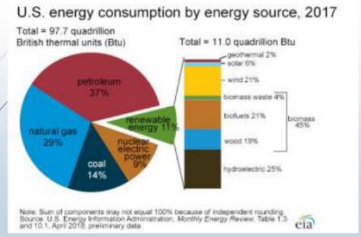
Focus Areas

- Energy
- Water
- Waste
- Transportation
- Food

Energy

- Depending on what type is used, can contribute much or little to carbon emissions
- Types of energy: coal, natural gas, petroleum, wind, solar, nuclear, biofuel, hydroelectric
- What do we rely on the most?

U.S. energy consumption by energy source, 2017



Energy

- Lightbulb activity – how many incandescent lightbulbs does one ton of coal light up? How many LED?

- Future of energy: Solar, wind, nuclear, LEED certified and green buildings

Water

- Only 2.5% of the Earth's water supply is fresh water
- Less than 1% of that is available as drinking water
- Important to conserve and protect the water we have

Water

- Water use activity
  - How much water do you use on a daily basis?

Water

- Water use activity
  - How much water do you use on a daily basis?
  - Think about how long you typically spend in the shower and write it down

Water

- Water use activity
  - How much water do you use on a daily basis?
  - Think about how long you typically spend in the shower and write it down
- Average American spends 8.2 minutes in the shower and uses 17.2 gallons

Water

- How do you compare?
- What could you do to shorten your time in the shower?

Calculate your water use!

- https://www.watercalculator.org/

Waste

- How much waste we produce and how we dispose of it is a vital component of sustainability

Waste

- How much waste we produce and how we dispose of it is a vital component of sustainability
- The US makes up less than 5% of the worlds population, but generates over 30% of the world's trash

Waste

- How much waste we produce and how we dispose of it is a vital component of sustainability
- The US makes up less than 5% of the worlds population, but generates over 30% of the world's trash
- The current US recycling rate is around 34%
- Where does it go?

Waste

- Most waste ends up in landfills or in the ocean
- We are currently facing a plastic crisis

Waste - How to cut down

- Three R's



Waste - How to cut down

- Three R's: Reduce, Reuse, Recycle!



Waste - How to cut down

- Three R's: Reduce, Reuse, Recycle!
- Reduce: use fewer single use items, buy smart



Waste - How to cut down

- Three R's: Reduce, Reuse, Recycle!
- Reduce: use fewer single use items, buy smart
- Reuse: use items multiple times (reusable water bottle, glass Tupperware, steel straws, reusable bags, etc)



Waste - How to cut down

- Three R's: Reduce, Reuse, Recycle!
- Reduce: use fewer single use items, buy smart
- Reuse: use items multiple times (reusable water bottle, glass Tupperware, steel straws, reusable bags, etc)
- Recycle: keep bins for any single use items & take to a recycling center, donate old clothing, keep a compost bin for food/yard scraps, rain barrel for plants



Transportation

- Transportation is a large driver of carbon dioxide emissions, but there are ways we can cut down

Transportation

- Transportation is a large driver of carbon dioxide emissions, but there are ways we can cut down
- What country has the highest number of vehicles?

Transportation

- Transportation is a large driver of carbon dioxide emissions, but there are ways we can cut down
- What country has the highest number of vehicles?
- Many countries have highly developed transit systems and other methods of getting around

Transportation

- Most sustainable methods?

Transportation

- Most sustainable methods?
  - Walking or biking
  - Public transportation (buses, railways)
  - Carpooling
  - Hybrid or electric vehicles

Transportation

- Most sustainable methods?
  - Walking or biking
  - Public transportation (buses, railways)
  - Carpooling
  - Hybrid or electric vehicles
- Least sustainable methods?

Transportation

- Most sustainable methods?
  - Walking or biking
  - Public transportation (buses, railways)
  - Carpooling
  - Hybrid or electric vehicles
- Least sustainable methods?
  - Single passenger cars
  - Diesel trucks
  - Air travel

Food

- What we eat and how our food is grown has a big impact on the planet

Food

- What we eat and how our food is grown has a big impact on the planet
- Livestock, specifically cows, emit huge amounts of methane gases

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- Much of the produce we eat is sprayed with harmful chemicals

Food

- What we eat and how our food is grown has a big impact on the planet
- Livestock, specifically cows, emit huge amounts of methane gases
- Much of the produce we eat is sprayed with harmful chemicals
- Food is transported between countries

Food

- Strawberry activity - How far does your food travel?
  - Grocery store vs. farmers market
- Calculate the difference!
- What are the implications?
- Why may food cost less coming from another country?

Local Sustainability - GSU

- Center for Sustainability - Greenfest, No Impact Week
- Sustainability Grants – projects around campus
- Campus buildings – LEED certified, white roofs
- Bioswales on campus

Local Sustainability - Statesboro

- Recycling centers – roughly 13 in Bulloch Co
- Farmers Market
- Boro Recycling – brand new!
- Support for local businesses

Challenges

Challenges

- Availability of resources

Challenges

- Availability of resources
- Lack of Public Interest

Challenges

- Availability of resources
- Lack of Public Interest
- Government Resistance

Challenges

- Availability of resources
- Lack of Public Interest
- Government Resistance
- Contamination in Recycling

Challenges

- Availability of resources
- Lack of Public Interest
- Government Resistance
- Contamination in Recycling

- What can we do about each of these issues?

Challenges

- What are some challenges that you as an individual may face when you want to make sustainable choices?
  - Think of 1-2 challenges and discuss in groups
- What do you think would help to make sustainable choices easier?

Survey:

- Please complete the survey before you go!
- **https://tinyurl.com/y7gabx7o**

Thank you!!

APPENDIX D

FLIER FOR STUDENT RECRUITING